

- (g.) His knowledge of arithmetic must include the mensuration of superficies and solids and the extraction of the square root, and the application of these rules to questions relating to the power, duty and economy of engines and boilers, and to the strains in rods, shafts, and levers of the engine.

Service in the Royal Navy or Indian Marine.

33. Retired Engineers of the Royal Navy or Indian Marine are qualified to be examined for First-class Engineer's Certificates in the Mercantile Marine, provided that their character and ability have been satisfactory. Engineers.

34. Retired First-class Assistant or Assistant Engineers of the Royal Navy or Indian Marine may be examined for Second-class Engineer's Certificates in the Mercantile Marine under similar conditions. Assistant Engineers.

35. Temporary service in the Royal Navy or Indian Marine does not count.

36. Service performed on shore in the capacity of Engineer Artificer may count as workshop service to qualify a candidate for examination for a Second-class Engineer's Certificate of Competency in the Mercantile Marine. Temporary service.
Engineer Artificer.

37. Application for permission to be examined must be made to the Port Officer.

Fees.

38. Candidates for examination, in making their application on Form Exn. 3, will be required to pay the examination fees before any step is taken, whether by inquiring into their services or testing their qualifications, &c.

39. The fee for examination must be paid to the Port Officer.

40. If a candidate fails in his examination, *no part of the fee he has paid will be returned to him.*

41. The fees are as follow :—

Engine-driver's Certificate	-	-	Rs. 10
Inland Engineer's Certificate	-	-	„ 12
Second-class Engineer's Certificate	-	-	„ 12
First-class Engineer's Certificate	-	-	„ 24
First-class Engineer's Certificate if candidate is already in possession of a Second-class Certificate of competency granted by the Board of Trade or by the Government of a British Possession under Section 8 of the Merchant Shipping (Colonial) Act, 1869	-	-	„ 12
Renewal of any certificate	-	-	„ 5

Fees to be paid by applicants for examination. (S. 133, Exn. 17.)

General Rules as to Examinations.

42. All books necessary for the use of candidates under examination will be provided by the Local Government, and applicants will not be permitted to take into the examination room any book, paper, document, or memoranda of any description whatever, and subject to the provisions referred to hereafter. They will also not be allowed to work out their problems on a slate or on waste paper. Candidates not to take books, &c., into examination room.

43. Candidates will be allowed in the time allotted to cancel any part of their work, and when required additional papers will be supplied by the examiners. These additional sheets must be attached to and form part of the examination papers.

44. Candidates for First-class Certificates have to pass an examination in Rough Working Drawing, which may be either hand sketches clearly dimensioned and complete in the necessary views and sections, or drawings to a scale. Drawing boards and T squares will be provided by the Local Government, but the applicants will have to bring with them any drawing instruments they may require.*

Punishment
for breaking
rules.

45. In the event of any candidate being discovered copying from another, or affording any assistance or giving any information to another, or communicating in any way with another during the time of examination, he will be regarded as having failed in his examination, and will be turned back for three months, in the same manner as if he had failed in the practical part of the examination; and no part of the fees he may have paid for examination will be returned to him.

Leaving exa-
mination room.

46. If a candidate leaves the room before answering any question which has been given to him, he cannot afterwards be permitted to answer it, but the Examiners may substitute other data or another question.

Questions from
Form Exn. 15a.

47. All applicants presenting themselves for examination will be required to give written answers to eight out of a list of ten questions selected from Form Exn. 15a.,† "Elementary Questions for the first examinations of Engineers for certificates of competency." These questions are intended to furnish a record to some extent of the candidate's knowledge at the time of his examination, and also to induce the candidates to pay more attention to their handwriting and spelling.

48. The Form Exn. 15b.,† on which these answers will be written, contains also some questions as to the experience of the applicant, to be answered by him in writing.

49. Examiners may add to their *visd voce* questions on the practical management of steam engines and boilers any of those contained in Exn. 15a.

50. If at the expiration of the time allowed the Candidate has worked out correctly the whole of the questions set to him, and given satisfactory answers in the *visd voce* examination, he will be declared to have passed.

51. If at the expiration of the time allowed he has not worked out the whole of the questions set to him, but if the result of the *visd voce* examination taken in connection with the answers to such of the questions as he has worked out is sufficient to satisfy the Examiner that the applicant is competent to take charge of engines, he will be declared to have passed.

(Exn. 15)

52. In other cases he will be declared to have failed.

53. A report of the examination, and the examination papers, will be forwarded to the Port Officer on the Form Exn. 15).

Notification of
having passed
will be given
to successful
candidates.
(Exn. 16.)

54. If the candidate passes he will receive the Form Exn. 16, which authorises the Port Officer to issue the Certificate to the candidate, whose testimonials, &c., will be returned at the same time. It is therefore important that the port of destination of the certificate should be the same on both the Form Exn. 16 and the Form Exn. 2. If circumstances should make any alteration necessary, the examiners should see that it is made in both forms, otherwise delay in the issue of the certificate may be caused.

Failure.

55. If the applicant fails in the *visd voce* or practical part of the examination he may not present himself for re-examination until he can produce proofs of THREE MONTHS' further service at sea as Engineer from the date of failure. If he fails in arithmetic or drawing only, he may come up again at any time. Engine-drivers may be examined *de novo* after six months, if the past examination shewed that they might reasonably be expected to qualify.

By the Honourable the Lieutenant-Governor of Bengal.



Certificate of Competency

AS

ENGINEER OF AN INLAND STEAM VESSEL UNDER ACT VI OF 1884.

To _____

Whereas it has been reported to me that you have been found duly qualified to fulfil the duties of Engineer of an Inland Steam Vessel, I do hereby, in pursuance of Act VI of 1884, grant you this CERTIFICATE OF COMPETENCY.

Given under my Hand and Seal,

By order of the Government of Bengal,

This _____ day of _____ 18____.

Port Officer.

No. of Certificate of Competency

Bearer _____

Date and Place of Birth _____

No. of Register Ticket _____

Signature _____

Any ENGINEER who fails to deliver up a Certificate which has been cancelled or suspended, is liable to a penalty not exceeding Rs. 500.

Issued at the Port of Calcutta on the _____ day of _____ 18____.



By the Honourable the Lieutenant-Governor of Bengal.

Certificate of Competency

AS

ENGINE-DRIVER OF AN INLAND STEAM VESSEL UNDER ACT VI OF 1884.

To _____

Whereas it has been reported to me that you have been found duly qualified to fulfil the duties of Engine-Driver on an Inland Steam Vessel having engines of under 80 nominal horse-power, I do hereby, in pursuance of Act VI of 1884, grant you this CERTIFICATE OF COMPETENCY as Engine-Driver.

Given under my Hand and Seal,

By order of the Government of Bengal

This _____ day of _____ 188____

Port Officer.

No. of Certificate

Bearer _____ son of _____ by caste _____

Date* and Place of Birth showing Village, Thana and District _____

Residence showing Village, Thana and District _____

Height _____

Personal description, stating particularly any permanent marks or scars _____

No. of Register Ticket _____

Signature _____

Issued at the Port of Calcutta on the _____ day of _____ 18 ____.

* If not known exactly must be stated on the best information or evidence.

Government of
Bengal.BENGAL.

By the Honourable the Lieutenant-Governor of Bengal.

In accordance with Her Majesty's order in Council of the 22nd June 1882, issued
under section 8 of the Merchant Shipping (Colonial) Act, 1869.

Colonial Certificate of Competency

AS

FIRST CLASS ENGINEER.

To _____

Whereas it has been reported to me that you have been found duly qualified to fulfil the duties of FIRST CLASS ENGINEER in the Merchant Service, I do hereby, in pursuance of Act VII of 1884, grant you this Certificate of Competency.

By order of the Government of Bengal.

this _____ day of _____ 18 ____.

Countersigned,

Port Officer,

Chief Engineer of the Government Dockyard.
Registered at the Office of the Port Officer.

BENGAL.No. of Certificate 

Address of Owner _____

Date and Place of Birth _____

Signature _____

This Certificate is given upon an ORDINARY EXAMINATION passed at _____ on the
day of _____ 18 ____.

Any ENGINEER who fails to deliver up a Certificate which has been cancelled or suspended, is liable to a penalty not exceeding Rs. 500. This Certificate is liable to be cancelled or suspended by any Court or Tribunal which has power under the Imperial Act 25 and 26 Vic., cap. 63, sec. 23, to cancel or suspend Certificates.

N.B.—Any person other than the owner thereof becoming possessed of this Certificate is required to transmit it forthwith to the Port Officer, Calcutta.

Issued at the Port of Calcutta on the _____ day of _____ 18 ____.

BENGAL.

Government of Bengal.

By the Honorable the Lieutenant-Governor of Bengal.

In accordance with Her Majesty's order in Council of the 22nd June 1882, issued
under section 8 of the Merchant Shipping (Colonial) Act, 1869.

Colonial Certificate of Competency

AS

SECOND CLASS ENGINEER.

To

Whereas it has been reported to me that you have been found duly qualified to fulfil the duties of
SECOND CLASS ENGINEER in the Merchant Service, I do hereby, in pursuance of Act VII of 1884, grant you
this Certificate of Competency.

By order of the Government of Bengal,

Countersigned,

Port Officer.

this _____ day of _____ 18____.

Chief Engineer of the Government Dockyard.

Registered at the Office of the Port Officer.

BENGAL.No. of Certificate 

Address of Owner _____

Date and Place of Birth _____

Signature _____

This Certificate is given upon an ORDINARY EXAMINATION passed at _____ on the _____
day of _____ 18____.

Any ENGINEER who fails to deliver up a Certificate which has been cancelled or suspended, is liable to a penalty not
exceeding Rs. 500. This Certificate is liable to be cancelled or suspended by any Court or Tribunal which has power under the
Imperial Act 25 and 26 Vic., cap. 63, sec. 23, to cancel or suspend Certificates.

N.B.—Any person other than the owner thereof becoming possessed of this Certificate, is required to transmit it forthwith to the
Port Officer, Calcutta.

Issued at the Port of Calcutta on the _____ day of _____ 18____.

Government of
Bengal.

By the Honorable the Lieutenant-Governor of Bengal.

Certificate of Competency

AS

ENGINE-DRIVER OF A SEA-GOING STEAM VESSEL UNDER ACT VII OF 1884.

To

Whereas it has been reported to me that you have been found duly qualified to fulfil the duties of Engine-Driver
on a sea-going steam ship having engines of under 50 nominal horse-power, I do hereby, in pursuance of Act VII of 1884, grant you
this CERTIFICATE OF COMPETENCY as Engine-Driver.

By order of the Government of Bengal,

Given under my Hand and Seal,

This _____ day of _____ 18____.

Port Officer.

No. of Certificate

Bearer _____ son of _____ by caste _____

Date* and Place of Birth showing Village, Thana and District _____

Residence showing Village, Thana and District _____

Height _____

Personal description, stating particularly any permanent marks or scars _____

No. of Register Ticket _____

Signature _____

Issued at the Port of Calcutta on the _____ day of _____ 18 _____

* If not known exactly must be stated on the best information or evidence.

NOTIFICATION.

The 4th November 1885.—The following telegram received from Alexandria, dated the 3rd instant, is published for general information.

J. WARE EDGAR,
Offg. Secy. to the Govt. of Bengal.

Telegram dated the 3rd November 1885.

From—Alexandria <i>via</i> Suez Govt.		To—Calcutta.
From—British Consul.		To—Government.

CALCUTTA admitted free pratique.

NOTIFICATION.

The 9th November 1885.—The following telegram, received from the Government of Bombay, dated the 5th instant, is published for general information.

J. WARE EDGAR,
Offg. Secy. to the Govt. of Bengal.

Telegram dated the 5th November 1885.

From—Bombay.		To—Calcutta.
From—General Secretary.		To—Bengal.

FOLLOWING from Political Resident, Aden, dated 4th November 1885. The Agent and Consul-General, Cairo, telegraphs :—Calcutta admitted to free pratique in Suez. Quarantine at Suez on arrivals from Tonquin, Aden, and Perim. Comply.

[Second Publication.]

NOTIFICATION.

The 3rd November 1885.—The following Notice to Mariners is published for general information.

J. WARE EDGAR,
Offg. Secy. to the Govt. of Bengal.

GOVERNMENT OF BENGAL, MUNICIPAL (MARINE) DEPARTMENT.

NOTICE TO MARINERS.—(No. 60.)

INDIA—WEST COAST.

KONKAN DISTRICT.

ALIBAG PORT.

Replacement of Buoy.

THE Director of the Indian Marine, in consequence of information received from the Collector of Salt Revenue, Bombay, has notified that the Alibag buoy, which had broken adrift, was replaced in position on the 1st October 1885.

By direction of the Government of Bengal,

ARTHUR W. STIFFE, *Captain, I.M.,*
Port Officer of Calcutta.

PORT OFFICE, Calcutta, the 30th October 1885.

[Second Publication.]

NOTIFICATION.

The 3rd November 1885.—The following Notice to Mariners is published for general information.

J. WARE EDGAR,
Offg. Secy. to the Govt. of Bengal.

GOVERNMENT OF BENGAL, MUNICIPAL (MARINE) DEPARTMENT.

NOTICE TO MARINERS.—(No. 61.)

BAY OF BENGAL.

CHITTAGONG COAST.

KORNAFULI RIVER.

Change in the Channel to the Port.

THE Port Officer of Chittagong has given notice that the bar had been carefully sounded on the 9th October 1885, and a depth of 11½ feet was found at low water spring tides on Track No. 1, with the leading marks on, and 12 feet on Track No. 2, with the leading marks on.

NOTE.—The sand which had formed inside the outer bar buoys having scoured away, the black nun buoy which hitherto marked this danger will shortly be removed.

By direction of the Government of Bengal,

ARTHUR W. STIFFE, *Captain, I.M.,*
Port Officer of Calcutta.

PORT OFFICE, Calcutta, the 30th October 1885.

[Second Publication.]

NOTIFICATION.

The 3rd November 1885.—The following Notice to Mariners is published for general information.

J. WARE EDGAR,

Offg. Secy. to the Govt. of Bengal.

GOVERNMENT OF BENGAL, MUNICIPAL (MARINE) DEPARTMENT.

NOTICE TO MARINERS—(No. 62.)

INDIA—WEST COAST.

MADRAS PRESIDENCY.

MALABAR COAST.

MANGALORE.

Position of Floating Wreck.

THE Port Officer, Cochin, has notified that information has been received from the Master of the S. S. *Byculla* that a *buggalow* was sighted drifting up the coast, midway between Mangalore and Cannanore, in the early part of October 1885, side up, in latitude $12^{\circ} 18' N$, and longitude $74^{\circ} 51' E$.

NOTE.—Masters of vessels are cautioned to keep a careful look out when proceeding up or down the coast at night, or during the prevalence of thick weather.

By direction of the Government of Bengal,

ARTHUR W. STIFFE, *Captain, I.M.,**Port Officer of Calcutta.*

PORT OFFICE, Calcutta, the 30th October 1885.

[Second Publication.]

NOTIFICATION.

The 3rd November 1885.—The following Notice to Mariners is published for general information.

J. WARE EDGAR,

Offg. Secy. to the Govt. of Bengal.

GOVERNMENT OF BENGAL, MUNICIPAL (MARINE) DEPARTMENT.

NOTICE TO MARINERS—(No. 63.)

INDIA—WEST COAST.

KONKAN DISTRICT.

JARJTAPUR PORT.

Replacement of Buoy.

THE Director of the Indian Marine, in consequence of information received from the Collector of Salt Revenue, Bombay, has notified that the Jaytapur buoy, which had broken adrift, was replaced in position on the 2nd October 1885.

By direction of the Government of Bengal,

ARTHUR W. STIFFE, *Captain, I.M.,**Port Officer of Calcutta.*

PORT OFFICE, Calcutta, the 30th October 1885.

[Second Publication.]

NOTIFICATION.

The 3rd November 1885.—The following Notice to Mariners is published for general information.

J. WARE EDGAR,

Offg. Secy. to the Govt. of Bengal.

GOVERNMENT OF BENGAL, MUNICIPAL (MARINE) DEPARTMENT.

NOTICE TO MARINERS.—(No. 64.)

INDIA—EAST COAST.

BAY OF BENGAL.

COAST OF ORISSA.

Re-exhibition of the Puri Permanent Light.

WITH reference to this Department Notice to Mariners, No. 54, of the 22nd September 1885, on the reported repairs to the lantern at Puri, the Collector of Customs there has notified that the lantern of the permanent light having been repaired, the *white fixed dioptric* (Chance's Port Light) light was again exhibited on the 7th October.

By direction of the Government of Bengal,

ARTHUR W. STIFFE, *Captain, I.M.,**Port Officer of Calcutta.*

PORT OFFICE, Calcutta, the 30th October 1885.

[Second Publication.]

NOTIFICATION.

The 3rd November 1885.—The following Notice to Mariners is published for general information.

J. WARE EDGAR,
Offg. Secy. to the Govt. of Bengal.

GOVERNMENT OF BENGAL, MUNICIPAL (MARINE) DEPARTMENT.

NOTICE TO MARINERS—(No. 65.)

INDIA—WEST COAST.

KONKAN DISTRICT.

MALVAN PORT.

Replacement of Buoy.

THE Director of the Indian Marine, in consequence of information received from the Collector of Salt Revenue, Bombay, has notified that the Malvan buoy, which had broken adrift, was replaced in position on the 29th September 1885.

By direction of the Government of Bengal,

ARTHUR W. STIFFE, Captain, I.M.,
Port Officer of Calcutta.

PORT OFFICE, Calcutta, the 30th October 1885.

[Second Publication.]

NOTIFICATION.

The 3rd November 1885.—The following Notice to Mariners is published for general information.

J. WARE EDGAR,
Offg. Secy. to the Govt. of Bengal.

GOVERNMENT OF BENGAL, MUNICIPAL (MARINE) DEPARTMENT.

NOTICE TO MARINERS—(No. 66.)

BAY OF BENGAL.

CHITTAGONG COAST.

KORNAFULI RIVER.

Buoy marking Sand off Patunga Island.

THE Port Officer of Chittagong has notified that on the 15th October 1885 the Noakhali buoy had been moved off the sands running from Patunga Island, in the Port of Chittagong, to indicate the extension which has taken place there.

The buoy lies in 12 feet at low water on any springs, distant 100 feet E.S.E. from its old position.

By direction of the Government of Bengal,

ARTHUR W. STIFFE, Captain, I.M.,
Port Officer of Calcutta.

PORT OFFICE, Calcutta, the 30th October 1885.

[Second Publication.]

NOTIFICATION.

The 3rd November 1885.—The following Notice to Mariners is published for general information.

J. WARE EDGAR,
Offg. Secy. to the Govt. of Bengal.

GOVERNMENT OF BENGAL, MUNICIPAL (MARINE) DEPARTMENT.

NOTICE TO MARINERS—(No. 67.)

INDIA—WEST COAST.

KONKAN DISTRICT.

BANKOT PORT.

Replacement of Buoy.

THE Director of the Indian Marine, in consequence of information received from the Collector of Salt Revenue, Bombay, has notified that the Bankot buoy, which had broken adrift, was replaced in position on the 2nd October 1885.

By direction of the Government of Bengal,

ARTHUR W. STIFFE, Captain, I.M.,
Port Officer of Calcutta.

PORT OFFICE, Calcutta, the 30th October 1885.

[Second Publication.]

NOTIFICATION.

The 3rd November 1885.—The following Notice to Mariners is published for general information.

J. WARE EDGAR,
Offg. Secy. to the Govt. of Bengal.

GOVERNMENT OF BENGAL, MUNICIPAL (MARINE) DEPARTMENT.

NOTICE TO MARINERS—(No. 68.)

BAY OF BENGAL.

BURMA COAST—ARAKAN.

KYOUK PHYOU HARBOUR.

Reported incorrect position of Reliance Shoal Buoy.

INTIMATION has been received from the Port Officer, Akyab, that the buoy lying off Reliance Shoal, Kyouk Phyou Harbour, is out of position.

NOTE.—Mariners, inward or outward bound, are cautioned accordingly.

By direction of the Government of Bengal,

ARTHUR W. STIFFE, *Captain, I.M.*,

Port Officer of Calcutta.

PORT OFFICE, Calcutta, the 30th October 1885.

DECLARATION.

The 7th November 1885.—Whereas it appears to the Lieutenant-Governor of Bengal that land is required to be taken by Government at the public expense for a public purpose, viz. for a post office bungalow and cookshed in the village of Sailkora, pergunnah Mahammed Shahi, in the district of Jessore, it is hereby declared that for the above purpose a piece of land measuring, more or less, $13\frac{1}{2}$ cottahs of standard measurement, bounded on the north by Hidu Lasker's land, south by the river Kumer, east by Hidu Lasker's land and west by Hari Charan Shah's and Kashi Nath Acharjee's land is required within the afore-said village of Sailkora.

This declaration is made, under the provisions of section 6 of Act X of 1870, to all whom it may concern.

A. P. MACDONNELL,
Secy. to the Govt. of Bengal.

JUDICIAL DEPARTMENT.

No. 3317A.

The 31st October 1885.—The Lieutenant-Governor accepts the resignation tendered by Mr. J. Murdoch of his appointment of Presidency Magistrate for the town of Calcutta.

The 4th November 1885.—Under the authority vested in him by the final clause of section 357 of the Code of Criminal Procedure, Act X of 1882, the Lieutenant-Governor empowers Baboo Raghunath Sahai, Temporary Deputy Magistrate, Sarun, to take down evidence in criminal cases in the English language.

The 9th November 1885.—Mr. H. F. J. T. Maguire, Officiating Joint-Magistrate of the 24-Pergunnahs, is empowered to take cognizance, under clause (c), section 191 of Act X of 1882, of offences for which he may try or commit for trial.

Baboo Jogendra Nath Deb, Additional Munsif of Gya, is appointed to be an Additional Munsif in the district of Bhagulpore, to be ordinarily stationed at the sudder station of that district.

Baboo Jogendra Lall Chowdhri, Munsif of Gouripura, in the district of Tipperah, is appointed to be an Additional Munsif in the district of Jessore, to be ordinarily stationed at Magoorah.

Baboo Bolac Chand, Subordinate Judge of Purneah, on leave, is appointed to act, until further orders, as Additional Subordinate Judge of Bhagulpore.

Baboo Nobin Chunder Gangooly, Subordinate Judge of Moorshedabad, is appointed to act, until further orders, as Additional Subordinate Judge of Tirhoot.

Baboo Anghore Nath Ghose, Second Subordinate Judge of Tipperah, is appointed to act, until further orders, as Additional Subordinate Judge of Chittagong.

The 10th November 1885.—The Lieutenant-Governor accepts the resignation tendered by Baboo Balkissen Lal of his appointment of Honorary Magistrate for the Jhowgunge Bench, in the district of Patna.

F. B. PEACOCK,
Chief Secy. to the Govt. of Bengal.

PUBLIC WORKS DEPARTMENT,—BENGAL.

The 4th November 1885.

No. 438.—Posting.—Mr. T. E. Curry, Executive Engineer, fourth grade, *sub pro tem*, having reported his return from furlough on the forenoon of the 4th instant, the unexpired portion of the same is hereby cancelled. Mr. Curry is posted to the Orissa Circle.

No. 439.—Posting.—With reference to Notification No. 268 of the 6th October 1885 of the Government of India, Public Works Department, Mr. George Cooper Stawell, Assistant Engineer, second grade, from the Royal Indian Engineering College, who reported his arrival in Calcutta on the 2nd November 1885, is posted to the Orissa Circle.

A. D. McARTHUR, Major, R.E.,
For Joint-Secy. to the Govt. of Bengal, P. W. Dept.

The 5th November 1885.

No. 440.—Posting.—With reference to Notification No. 268 of the 6th October 1885 of the Government of India, Public Works Department, Mr. James Sandiford Lane Long, Assistant Engineer, second grade, from the Royal Indian Engineering College, who reported his arrival in Calcutta on the 2nd November 1885, is posted to the Central Circle.

S. T. TREVOR, Col., R.E.,
Secy. to the Govt. of Bengal, P. W. Dept.

The 5th November 1885.

No. 441.—Posting.—With reference to Notification No. 431 of the 3rd instant, Mr. A. H. Mason, Executive Engineer, fourth grade (temporary rank), is posted to the South-Western Circle.

The 9th November 1885.

No. 442.—Transfer.—Mr. A. E. Silk, Assistant Engineer, first grade, *sub pro tem*, is transferred in the interests of the public service from the Mahanuddy to the Brahmini-Byturni Division.

A. D. McARTHUR, Major, R.E.,
For Joint-Secy. to the Govt. of Bengal, P. W. Dept.

The 9th November 1885.

No. 443.—Leave.—Mr. T. Beatty, Executive Engineer, second grade, and Divisional Superintendent of Works, Rajshahye, was on privilege leave from the 10th July to 9th October 1885.

No. 444.—Leave.—Mr. J. F. H. Collet, Assistant Engineer, first grade, Northern Bengal State Railway, is granted three weeks' privilege leave from the 18th November 1885, or such date as he may avail himself of the same.

S. T. TREVOR, Col., R.E.,
Secy. to the Govt. of Bengal, P. W. Dept.

The 9th November 1885.

No. 445.—In modification of Notification No. 392, dated 22nd September 1885, Lieutenant-Colonel J. M. Heywood, R.E., Superintending Engineer, is granted privilege leave for two months, with effect from the 16th October 1885, instead of from the 17th idem as notified.

A. D. McARTHUR, Major, R.E.,
For Joint-Secy. to the Govt. of Bengal, P. W. Dept.

The 10th November 1885.

No. 446.—The following Resolution of the Government of India, Public Works Department, is republished for general information :—

No. 1638G., dated 30th October 1885.

Read again—

Public Works Department Resolution No. 195G., dated 4th February 1885.

Read also—

Memorandum from the Accountant-General, Public Works Department, No. 972, dated 26th September 1885.

RESOLUTION.—It having been brought to the notice of the Government of India that the rules for the conduct of the Civil Engineers' Provident Fund, promulgated in the

Resolution, now read again, are silent in regard to subscriptions during leave, His Excellency the Governor-General in Council is pleased to rule—

- I.—That an officer on leave of any kind may, at his option, subscribe any sum he pleases, subject to a minimum of 5 per cent. on his leave allowances, and a maximum of 10 per cent. on the salary he would draw if on duty.
- II.—That when an officer's leave allowances are drawn in India, the subscription shall be dealt with as usual on audit of salary. When, however, they are payable out of India, or when an officer is on leave without allowances, he can contribute such amount as he pleases between the minimum and maximum as in Rule I, but must make his own arrangements for so doing.

The Governments of Madras, Bombay, Bengal, the North-Western Provinces and Oudh, and the Punjab.
 The Chief Commissioners, Central Provinces, British Burma, Assam, and Coorg.
 The Resident at Hyderabad.
 The Agent to the Governor-General for Central India, Rajputana, and Beluchistan.
 The Accountant-General, Public Works Department.
 The Inspector-General of Military Works.
 The Director-General of Railways.
 The Consulting Engineers to the Government of India for Guaranteed Railways, Calcutta, Lahore, and Lucknow.
 The Director-General of Telegraphs in India.
 The Director-in-Chief, Indo-European Telegraph.
 The Director, Persian Telegraph.
 The Director, Persian Gulf Telegraph.
 The Superintendent of Works, Simla Imperial Circle.

ORDER.—Ordered that this Resolution be forwarded to the Local Governments, Administrations and officers noted on the margin, and to the Department of Finance and Commerce.

Also that it be published in the *Gazette of India* and in all local Gazettes.

LOCAL COMMUNICATIONS.

The 10th November 1885.

No. 447.—*Declaration*.—Whereas it appears to the Lieutenant-Governor of Bengal that land is required to be taken by Government at the expense of the Dacca Road Cess Committee for a public purpose, viz. for a road from Shally Shab's Darga to the Mirpur road, in the village of Mirpur, zillah Dacca, it is hereby declared that for the above purpose a piece of land measuring, more or less, 24 beegahs 15 cottahs 9 dhoors of standard measurement, bounded on the north by Shally Shab's Darga, on the south by the Mirpur road, on the east by the Godakhally khal, and on the west by the villages of Bosepara, Kandar, Hariram-pur, and Bhaibarbag is required within the aforesaid village of Mirpur.

This declaration is made, under the provisions of section 6 of Act X of 1870, to all whom it may concern.

S. T. TREVOR, Col., R.E.,
 Secy. to the Govt. of Bengal, P. W. Dept.

IRRIGATION.

The 10th November 1885.

No. 448.—*Declaration*.—Whereas it appears to the Lieutenant-Governor of Bengal that land is required to be taken by Government at the public expense for a public purpose, viz. for protective revetment above the Albha Lock on the Gobri Canal, in the village of Albha, pergunnah Utikan, zillah Cuttack, it is hereby declared that for the above purpose a piece of land measuring, more or less, 5 acres 30 poles of standard measurement, bounded on the north by the river Brahmini; on the south by the embankment on the right bank of Brahmini; on the east by the Gobri Canal and Albha Lock; and on the west by the lakhiraj land of Bidyadhar Das, is required within the aforesaid village of Albha.

This declaration is made, under the provisions of section 6 of Act X of 1870, to all whom it may concern.

A. D. McARTHUR, Major, R.E.,
 For Joint-Secy. to the Govt. of Bengal, P. W. Dept.

The 10th November 1885.

No. 449.—*Declaration*.—Whereas it appears to the Lieutenant-Governor of Bengal that land is required to be taken by Government at the public expense for the East Indian Railway Company, viz. for the accommodation of their traffic staff, in the village of Tepua Madonsahi, pergunnah Teliagarhi, zillah Sonthal Pergunnahs, sub-division Rajmehal, it is hereby declared that for the above purpose three pieces of land measuring, more or less, 30 bigahs 19 cottahs 11 chittacks of standard measurement, bounded as follows:—

One piece of land, measuring 1 bigah 10 cottahs, bounded on the north by river Ganges, south by jote land of Sibnarain Singh, east by saw mill of Messrs. Fraser and Company and zemindari land of Mr. Grant, and west by Mr. Grant's zemindari land.

Second piece of land, measuring 3 bigahs 10 cottahs of land, bounded on the north by Ganges, south and east by Mr. Grant's zemindari, and west by Railway Company's land.

Third piece, measuring 25 bigahs 19 cottahs 11 chittacks, bounded on the north by Ganges, south by old Sahibgunge road, east by Mr. Daveria's thatched bungalow and premises, west by Mr. Daveria's pucca bungalow and railway land.

Are required within the aforesaid village of Tepua Madonsahi, sub-division Rajmehal, pergunnah Teliagarhi.

This declaration is made, under the provisions of section 6 of Act X of 1870, to all whom it may concern.

S. T. TREVOR, Col., R.E.,
Secy. to the Govt. of Bengal, P. W. Dept.

JAIL DEPARTMENT.

No. 10526.—*The 4th November 1885*—Surgeon J. French-Mullen made over charge of the Tipperah Jail to Baboo Motilal Mukerjee on the afternoon of the 25th October 1885.

No. 10534.—*The 4th November 1885*.—Baboo Shama Churn Dass made over charge of the Mymensingh Jail to Surgeon James Moorhead on the forenoon of the 24th October 1885.

No. 10535.—*The 4th November 1885*.—Surgeon W. Beatson made over charge of the Patna Jail to Surgeon-Major H. B. Purves on the afternoon of the 27th October 1885.

No. 10625.—*The 9th November 1885*.—Surgeon D. Basu made over charge of the Furreedpore Jail to Assistant Surgeon Kristo Churn Basu on the forenoon of the 31st October 1885.

No. 10628.—*The 9th November 1885*.—Mr. M. S. Emerson made over charge of the Bhagulpore District Jail to Mr. W. A. C. Beadon on the forenoon of the 3rd November 1885.

No. 10629.—*The 9th November 1885*.—Mr. M. S. Emerson made over charge of the Bhagulpore Central Jail to Mr. W. A. C. Beadon on the forenoon of the 3rd November 1885.

No. 10630.—*The 9th November 1885*.—Assistant Surgeon Gopal Chunder Dey made over charge of the Beerbhoom Jail to Mr. F. W. Duke on the afternoon of the 30th October 1885.

A. D. LARMORE,
For Inspector-General of Jails, Bengal.

No. 10739.—*The 9th November 1885*.—Assistant Surgeon Upendra Nath Sen made over charge of the Monghyr Jail to Surgeon W. Beatson on the forenoon of the 1st November 1885.

A. S. LETHBRIDGE,
Inspector-General of Jails, Bengal.

Sheriff's Office, the 4th November 1885.

NOTICE is hereby given that the Sixth Criminal Sessions of the year 1885 of the High Court of Judicature at Fort William in Bengal, for the Town of Calcutta and Factory of Fort William, and the places subordinate thereto, will be holden at the Court House, in the Town of Calcutta, on Wednesday, the Second day of December next, at 11 o'clock in the forenoon, and so on from day to day until the said Sessions be over. And it is hereby proclaimed that all persons who will prosecute any of the prisoners to be brought up for trial at the said Sessions be present then and there to prosecute.

G. E. KEITH, Sheriff.

শরিফ অফিস সন ১৮৮৫ সাল তারিখ ৪ঠা নবেম্বর।

সকলকে সমাচার দেওয়া যাইতেছে যে শ্রবে বাঙ্গালার কোর্ট উইলিয়াম দুগের অধীন শহর কলিকাতার ও অন্যান্য স্থানের ফৌজদারী বিচার নিষ্পত্তি জন্য আগামী সন ১৮৮৫ সালের ২রা ডিসেম্বর বুধবার বেলা ১১ ঘটিকার সময় এবং যে পর্যন্ত সেশিয়ানের কার্য শেষ না হয় প্রতিদিন উ. সময়ে কলিকাতার হাই কোর্টের আপন আদালত ঘরে সন ১৮৮৫ সালের ষষ্ঠ ক্রিমিনেল সেশিয়ান বসিবেক এবং এতদ্বারা প্রচার করা যাইতেছে যে, যে সকল ব্যক্তি কোন কয়েদির বিরুদ্ধে ফৌজদারী মিছিল করিবেক তাহারা উক্ত স্থানে উক্ত সময়ে হাজির থাকিয়া মোকদ্দমা করে হাঁত

জি: ই: কিথ, শরিফ।

MEDICAL DEPARTMENT, BENGAL.

No. 8495.—*The 5th November 1885*.—Assistant Surgeon Raj Coomar Coondoo, attached to the sub-division and dispensary at Madhubani, in the district of Durbhunga, is allowed leave for three months, under section 72, chapter V of the Civil Leave Code.

No. 8497.—*The 5th November 1885*.—Assistant Surgeon Gopal Chunder Dey, a Supernumerary at the Presidency, is temporarily appointed to have medical charge of the sub-division and dispensary at Madhubani, in the district of Durbhunga, during the absence on leave, of Assistant Surgeon Raj Coomar Coondoo, or until further orders.

J. M. COATES, M.D.,
For Inspector-General of Civil Hospitals, Bengal.

EDUCATION DEPARTMENT, BENGAL.

Subordinate Educational Service.

The 3rd November 1885—Baboo Kumud Bandhu Bose, Deputy Inspector of Schools, Maldah (class V), is allowed leave of absence for two months and twenty days, under section 72, chapter V of the Civil Leave Code, with effect from the date on which he may avail himself of it.

The 4th November 1885.—Baboo Gopal Chandra Chakravarti, Sub Inspector of Schools, 24-Pergunnahs (class VII), was on leave of absence for one month and a half, under section 72, chapter V of the Civil Leave Code, with effect from the 3rd June 1885, or such subsequent date as he availed himself of it.

CHARLES H. TAWNEY,
Offg. Director of Public Instruction.

NOTIFICATION OF THE BOARD OF REVENUE.

No. 1031B.

NOTICE is hereby given that the Twelfth Sale of Opium, the Provision of 1882-83 and 1883-84, will be held at the Government Opium Sale-room, No. 2, Bankshall-street, on Thursday, the 3rd December 1885, at 11 A.M., and will comprise 4,166 chests, viz:—

	Chests.	
Opium manufactured at the Patna Factory ...	2 000	of which 8 chests are of 1882-83
Do. do. at the Ghazeeport Factory ...	2,166	all of 72° consistence.
Total ...	4,166	

2. The general conditions of the sale now advertised will be the same as usual. They may be ascertained by reference to the Notification issued on the 24th November 1884, and published in the *Government and Exchange Gazettes*, or on personal application at the office of the Board of Revenue.

3. The latest dates for deposit and clearance will be the 8th and 18th December 1885, respectively,—that is to say, no Bank of Bengal Receipts, Government Promissory Notes, or other public securities that may be tendered for deposit in redemption of Promissory Notes given by purchasers in the sale-room will be received after 3-30 P.M. of Tuesday, the 8th December 1885, and no Bank of Bengal Receipts in full payment of lots will be accepted after 3-30 P.M. of Friday, the 18th December 1885.

By order of the Board of Revenue, L.P.,

C. A. SAMUELLS, *Offg. Secretary.*

BOARD OF REVENUE, L.P., CALCUTTA the 27th October 1885.

Statement showing the Importation of Salt (Private Property) in Bond and Afloat on the River Hooghly subject to Customs Duty on the 31st October 1885.

DESCRIPTION OF SALT.	Government golahs.	Private golahs.	Afloat.	Total
	Mds.	Mds.	Mds.	Mds.
Liverpool Punga	78,950		2,17,905	2,96,859
Italian Kurkutch	4,71,060		2,412	4,73,472
Bombay ditto	78,855			78,855
Arabian and Persian Gulfs Kur- kutch and Muscat Rock ...	1,37,293		90,797	2,28,090
Total ...	7,66,162		3,11,114	10,77,276

By order of the Board of Revenue, L. P.,

J. S. ARMSTRONG, *Collector of Customs.*

CUSTOM HOUSE, CALCUTTA, the 9th November 1885.



The Calcutta Gazette.

WEDNESDAY, NOVEMBER 18, 1885.

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PART I.

Orders and Notifications by the Lieut.-Governor of Bengal, the High Court, Government Treasury, &c.

ORDERS BY THE LIEUT.-GOVERNOR OF BENGAL

No. 3386A.

GENERAL.—*The 12th November 1885*—In modification of the order of the 2nd instant, Baboo Poorno Chunder Bysack, Officiating Deputy Magistrate and Deputy Collector, is posted to Serajunge in the district of Pubna.

This cancels the order of the 2nd instant, transferring Moulvie Abdool Khaliq, Deputy Magistrate and Deputy Collector, to Serajunge.

Baboo Shib Chunder Nag, Deputy Magistrate and Deputy Collector, Backergunge, is transferred to the sudder station of the district of Maldah.

The 14th November 1885.—Mr. H. Holmwood, Officiating Joint-Magistrate and Deputy Collector, Patna, is appointed to have charge of the Barh sub-division of that district.

Mr. G. E. Manisty, Joint-Magistrate and Deputy Collector, on furlough, is posted to the sudder station of the district of Patna.

Mr. Manisty is appointed to act, until further orders, in the first grade of Joint-Magistrates and Deputy Collectors, with effect from the date on which he joined his appointment.

Moulvie Faizuddeen Hossein, Deputy Magistrate and Deputy Collector, Silligoree, Darjeeling, is allowed leave for two months and fifteen days, under section 72, chapter V of the Civil Leave Code, with effect from such date as he may be relieved by Baboo Prosunno Coommar Dutt.

Mr. C. J. S. Faulder, Officiating Joint-Magistrate and Deputy Collector, Bhagalpore, is allowed leave for one month, under section 72, chapter V of the Civil Leave Code, with effect from the 1st December 1885.

Mr. W. H. Thomson, Temporary Deputy Magistrate and Deputy Collector, Raneeunge, Burdwan, is transferred to Bhagulpore, and is posted to the sudder station of that district.

Mr. W. Teunon, Officiating Joint-Magistrate and Deputy Collector, Rungpore, is appointed to have charge of the Raneeunge sub-division of the Burdwan district.

Mr. R. F. Rampini, Officiating District and Sessions Judge, 24-Pergunnahs, is appointed to act temporarily as Additional District and Sessions Judge, 24-Pergunnahs and Hooghly, till relieved by Mr. H. Beveridge.

Lieutenant-Colonel W. L. Samuells, Officiating Deputy Commissioner, Lohardugga, on leave, is appointed to act as Deputy Commissioner of Singbhoom, during the absence, on deputation, of Lieutenant-Colonel C. H. Garbett, or until further orders.

Mr. R. H. Renny, Assistant Commissioner, is appointed to act, until further orders, in the first grade of Assistant Commissioners, and is posted to the district of Singbhoom on being relieved of his present appointment as Officiating Deputy Commissioner of that district.

Mr. D. R. Lyall, Officiating Commissioner, Chittagong Division, is allowed leave for fourteen days, under section 72, chapter V of the Civil Leave Code, with effect from the 8th instant.

Mr. A. Manson, Magistrate and Collector, Chittagong, is appointed to act as Commissioner, Chittagong Division, during the absence, on leave, of Mr. D. R. Lyall, or until further orders.

Mr. S. J. Douglas, Officiating Joint-Magistrate and Deputy Collector, Chittagong, and Officiating Deputy Commissioner, Chittagong Hill Tracts, is appointed to act as Magistrate and Collector of Chittagong, during the absence, on deputation, of Mr. A. Manson, or until further orders, in addition to his duties as Officiating Deputy Commissioner of the Chittagong Hill Tracts.

Baboo Horo Chandra Ghose is appointed temporarily to be a Sub-Deputy Collector of the fourth grade, and is posted to the sudder station of the district of Burdwan, *vice* Moulvie Mohomed Abdurrauf, on deputation.

This cancels the order of the 16th October 1885, placing the services of Baboo Horo Chandra Ghose at the disposal of the Financial Department of this Government.

POLICE.—*The 14th November 1885.*—Mr. H. W. J. Bamber, District Superintendent of Police, Rajshahye, reported his departure from India, on furlough, on the afternoon of the 16th October 1885.

ECCLESIASTICAL.—*The 12th November 1885.*—The Revd. Suliman Soke, Pastor of the Evangelical Lutheran Church at Burju in the Lohardugga district, is licensed, under clause 5, section 5, Act XV of 1872, to grant certificates of marriage between persons who are Native Christians.

REGISTRATION.—*The 11th November 1885.*—Baboo Kali Pada Banerjee, Rural Sub-Registrar of Baluchar, in the district of Moorsshedabad, is appointed to be Rural Sub-Registrar of Rampore Hat, in the district of Beerbhoom, *vice* Baboo Mahabharat Saha, deceased.

Munshi Aulad Hossein, Rural Sub-Registrar of Srinagar, in the district of Dacca, is appointed to be Rural Sub-Registrar of Jhenida, in the district of Jessore.

EDUCATION.—*The 14th November 1885.*—Mr. R. Parry, Professor, Patna College, was absent from his duties, on leave, under section 50, chapter V of the Civil Leave Code, from the 7th September to the 11th October 1885.

F. B. PEACOCK,
Chief Secy. to the Govt. of Bengal.

REVENUE (FOREST) DEPARTMENT.

The 14th November 1885.—Mr. C. A. G. Lillingston, Assistant Conservator of Forests, first grade, is appointed to officiate in the fourth grade of Deputy Conservators, with effect from the 4th April 1885.

A. P. MACDONNELL,
Secy. to the Govt. of Bengal.

NOTIFICATION.

The 17th November 1885.—Mr. H. F. J. T. Maguire, Officiating Joint-Magistrate, is appointed, under the Indian Factories' Act of 1881, to be Inspector of Factories in the district of the 24-Pergunnahs.

A. P. MCDONNELL,
Secy. to the Govt. of Bengal.

NOTIFICATION.

The 14th November 1885.—The following telegram, received from the Government of Bombay, dated the 13th instant, is published for general information.

J. WARE EDGAR,
Offg. Secy. to the Govt. of Bengal.

Telegram dated the 13th November 1885.

From—Bombay.		To—Calcutta.
From—General Secretary.		To—Bengal.

FOLLOWING from British Consul, Alexandria, dated 12th November 1885 :—Arrivals from Ceylon and all the coast from Bassein to Bombay now admitted to free pratique.

NOTIFICATION.

The 14th November 1885.—The following papers regarding the removal of quarantine at Aden and Perim against arrivals from Calcutta, and the imposition of it at those places against arrivals from Tonquin, are republished for general information.

J. WARE EDGAR,
Offg. Secy. to the Govt. of Bengal.

*Quarantine: Removal of—*at Aden and Perim against arrivals from Calcutta and imposition of—*at Aden and Perim* against arrivals from Tonquin.

No. 4247.

GENERAL DEPARTMENT.

Bombay Castle, 9th November 1885.

Telegram from the Government of India, Home Department, Simla, dated 6th November 1885 :—

“Your telegram 5th. Withdrawal so much Bombay notification, 9th May 1885, as imposed quarantine at Aden and Perim on arrivals from Calcutta sanctioned. Imposition quarantine at Aden and Perim against arrivals from Tonquin also sanctioned.”

RESOLUTION.—It should be notified in a *Bombay Government Gazette Extraordinary* that, under instructions from the Government of India, so much of the notification of the Government of Bombay, No. 1719, dated 9th May 1885, as imposed quarantine at Aden and Perim on arrivals from Calcutta has been withdrawn. A notification should also be published bringing the B Quarantine Rules into operation at Aden and Perim against arrivals from Tonquin.

2. Copies of the notifications should be forwarded to the Political Resident, Aden, and the other officers and departments concerned for information, with reference to Government Resolution No. 4205, dated 5th instant. Copies should also be forwarded to the Governments of India, Bengal, Madras, and Ceylon, and the Chief Commissioner, British Burmah.

J. MONTEATH,
Under-Secy. to Government.

NOTIFICATION.

GENERAL DEPARTMENT.

Bombay Castle, 9th November 1885.

No. 4247.—Under instructions from the Government of India so much of the notification of the Government of Bombay, No. 1719, dated 9th May 1885, as imposed quarantine at Aden and Perim on arrivals from Calcutta, has been withdrawn.

By order of His Excellency the Right Hon'ble the Governor in Council,

J. NUGENT,
Secretary to Government.

GENERAL DEPARTMENT.

Bombay Castle, 9th November 1885.

No. 4248.—In exercise of the power conferred by Act I of 1870, the following Rules for quarantine against cholera have been made by the Government of Bombay, with the previous sanction of the Governor-General in Council: they will take effect from the 4th instant in the Port of Aden and at Perim as a temporary measure :—

I.—The Commander of every vessel, including buggalows or other native craft, arriving from Tonquin shall, before entering the harbour, indicate by signal the port from which such vessel has come.

II.—Such Commander shall not, except as hereinafter provided, allow any communication, either with the pilot boat, except orally, or with the shore, or with any other vessel or boat in the harbour.

III.—Immediately on arrival the Commander shall cause the letter R of the Commercial Signal Code to be hoisted, and shall keep the said flag flying during his stay in port or until authorized by the Health Officer to haul it down. If communication with the shore is not desired, the vessel shall anchor at such place as may be pointed out by the Port authorities, having regard to the season of the year. If communication with the shore is desired, the Health Officer shall go alongside the vessel, and, after all necessary enquiries, shall direct the Commander to take the vessel to the quarantine anchorage duly appointed and notified in that behalf by the Resident, there to remain for a period of seven days from the date of arrival, or for the shorter period prescribed in Rule IV, and undergo disinfection, which should apply as well to crew, passengers, effects, and susceptible goods.

IV.—If the Health Officer of the Port has sufficient evidence that no cases of a suspicious nature have taken place on board during the voyage, and if the vessel is besides in good hygienic condition, the duration of the quarantine will be diminished according to the following scale:—

After eight days of voyage	...	...	Six days of quarantine.
Do. nine	do.	...	Five do.
Do. ten	do.	...	Four do.
Do. eleven	do.	...	Three do.
Do. twelve	do.	...	Two do.
Do. thirteen	do.	and upwards	Twenty-four hours of quarantine.

V.—If during the period a vessel is at the quarantine anchorage aforesaid any case or cases of cholera should occur on board, the said vessel shall remain in quarantine for a period of seven days from the date of the last case occurring, and be subject to all the prohibitions provided for in Rule III.

VI.—When any vessel has been placed in quarantine as aforesaid the Health Officer may direct the removal of so many of the passengers and crew as may not be suffering from illness, and whose services may not be required on board the vessel, to such particular spots as may from time to time be selected by the Resident as places of quarantine, there to remain for a period of seven days. If a case of cholera occurs among such passengers and crew during any such period, they shall remain in a place of quarantine for a period of fifteen days from the date of the occurrence of the last case of such illness.

VII.—Any mails or cargo which may be brought by any vessel so arriving shall be landed under such precautions as the Health Officer may deem necessary to prevent the spread of the disease.

VIII.—It will be the duty of the Port Officer to facilitate the conveyance to all vessels in quarantine of such supplies of provisions, stores, and other articles as may be required by those on board. Such supplies will be placed on the boats of the vessels in quarantine to be subsequently removed by members of their crews.

IX.—All vessels arriving at Aden and Perim which may have communicated with vessels coming from Tonquin shall be subjected to the same quarantine as vessels arriving at Aden and Perim from that port.

X.—All vessels which have undergone quarantine in the manner above prescribed should have the fact clearly stated on their bills of health.

By order of His Excellency the Right Hon'ble the Governor in Council,

J. NUGENT,

Secretary to Government.

NOTIFICATION.

The 14th November 1885.—In modification of the notification, dated the 24th June 1884, published at page 707 of Part I of the *Calcutta Gazette* of the 25th idem, regarding the supply, within the territories under the Lieutenant-Governor of Bengal, of lime or lemon juice or other antiscorbutics for the use of ships in accordance with the provisions of section 6 of the Merchant Shipping Act of 1867, the Lieutenant-Governor is pleased to direct that the words "or by Shama Churn Datta & Co." be inserted in paragraph 2 of the notification after the words "No. 5, Beadon Street, Calcutta."

J. WARR EDGAR,

Offg. Secy. to the Govt. of Bengal.

[Second Publication.]
NOTICE.

The 6th November 1885.—The following draft of Rules, which it is proposed to issue under sections 21, 50 (clause 1) and 51 (clause 1) of Act VI of 1884, is published for general information. These rules will be taken into consideration on the expiry of a month from the date of their first publication in the *Calcutta Gazette*; and the Lieutenant-Governor will receive and give due attention to any objections or suggestions which may be made by any person within that period.

J. WARE EDGAR,
Offg. Secy. to the Govt. of Bengal

UNDER the powers conferred upon him by section 21 of Act VI of 1884 (the Inland Steam-vessels Act), and, with the sanction of the Governor-General in Council, the Lieutenant-Governor has been pleased to make the following rules for the survey of Inland steam-vessels:—

1. Surveys shall be made at the Ports of Calcutta, Chittagong, Patna, Cuttack, Goalundo, Kooshtea, Dehree, Khoolna, and at such other places, as may, from time to time, be declared by the Local Government to be places of survey upon due notice or application from the owner, on any day in the year, with the exception of Sundays and Government holidays, by the Surveyor or Surveyors appointed under the Act. The declarations of surveyors will be made and certificates of survey will be granted in the annexed forms on the payment of fees specified in the second Schedule annexed to the Act. Time and place of survey.

2. The Surveyors will be guided by the rules hereunto annexed in making their survey. In cases where two Surveyors are employed, the Engineer-Surveyor will survey the engines, boilers, and all the machinery required to be surveyed under the Act. The Ship-wright Surveyor will inspect the hull, equipments, and passenger accommodation; measure and determine the number of passengers the vessel is fit to carry, and see that the certificates of the master, mates, and engineers are such as is required by the Act; also that the lights and fog signals are in accordance with the regulations for the prevention of collisions at sea. Surveyors' duties.

3. Owners of steam-vessels requiring survey are requested to give the Surveyor at least three days' notice in writing when a survey is required, and are warned that, should such notice fail to be given, the Surveyor is not responsible for any delay or inconvenience which may occur in consequence. Notice of survey to be given.

4. This notice (which is to be preserved by the Surveyor) must state explicitly the name of the steamer to be surveyed, and the time when, and place at which, she will be ready for inspection. Particulars to be given in notice.

5. In order to prevent inconvenience and delay to the owners, the Surveyors are to be careful to be in attendance at the appointed time and place. Should they be unable to attend as required, notice should be given to the owners to that effect. Surveyors to attend at appointed time.

6. Should a steamer not be ready for inspection at the time arranged, the Surveyors may make such arrangements for the subsequent survey as may be convenient to the owner or his agent. All expenses arising out of this postponement will be charged against the owner when the certificate is issued. Survey if deferred.

SURVEYORS' DECLARATIONS.

7. The Surveyor's declaration under section 9 of the Act shall be made in the form hereunto annexed. The particulars required to be given in the declaration for a certificate of survey are the following, which are treated of under separate heads:— Surveyors' declarations.

- (1) That the hull of the vessel is sufficient for the service intended, and in good condition.

- (2) That the boats, life-buoys, lights, signals, compasses, and shelter for deck passengers, and the certificates of the master, engineer or engineers, engine-driver or engine-drivers, are such and in such condition as required by these rules.
- (3) The time (if less than 12 months) for which the said hull and equipments will be sufficient.
- (4) The limits (if any) beyond which, as regards the hull and equipments, the vessel is, in the Surveyor's judgment, not fit to ply.
- (5) The number of passengers (if any) which the ship is, in the Surveyor's judgment, fit to carry, distinguishing, if necessary between the respective numbers to be carried on deck and in the cabins and in different parts of the deck and cabins: such numbers to be subject to such conditions and variations according to the time of the year, the nature of the voyage, the cargo carried, and other circumstances as the case requires.

The declaration of the Surveyor as to the boilers and machinery is to contain a statement of the following particulars:—

- (1) That the machinery of the vessel is sufficient for the service intended, and is in good condition.
- (2) The time (12 months or less) for which such machinery will be sufficient.
- (3) That the safety valves and fire hose are such and in such condition as are required by these rules.
- (4) The limits of the weight to be placed on the safety valves.
- (5) The limits (if any) beyond which, as regards the machinery, the vessel is, in the Surveyor's judgment, not fit to ply.

When a Surveyor is, from any reason whatever, unable to complete his declaration, an incomplete declaration should be sent to those who applied for survey as soon as possible, stating in it the reasons for not being able to fill up all the particulars under the various headings. He must take care to obliterate all the items in this declaration that he is unable to certify to as being in accordance with the Acts and regulations.

Surveyors may go on board inland steam vessels.

8. Surveyors may go on board any vessel at any reasonable time for the purpose of inspecting either the certificates of the master, or engineer, or the vessel, the machinery, the boats, other equipments, or for any other purpose rendered necessary by the Act; and the owners, masters, and engineers of inland steam vessels are required by the Act to give to the Surveyors, on being requested so to do, all such information and assistance within their power as may be requisite for the purpose of making the returns required by the Act. In the performance of

this part of their duties, Surveyors are to be careful to avoid impeding the duty of the vessel, or wilfully giving offence to any of the officers. If they should be hindered or obstructed by any person in the performance of their duties, they should communicate the facts without delay to the officer authorized to grant a certificate of survey for the vessel concerned.

9. Surveyors should, if possible, make their inspections when the agent, master or chief mate, and engineer of the vessel are present. Repairs can then be required, and defects can be pointed out to the proper persons without incurring the uncertainty and delay attendant upon messages delivered to the subordinate officers. If the owners do not instruct a responsible representative to be present, the Surveyors will of course make the survey in his absence.

Inspection to be made in the presence of owner, agent, or responsible person.

10. In order to prevent mistakes as to the nature and extent of repairs required by the Surveyors, whenever they cannot give a declaration until repairs are effected or alterations made, a written statement of the nature and extent of the defects to be remedied or alterations required should in all cases be given to the owner or agent, whether applied for by him or not. A copy of the above should always be taken in the office Press Letter Book.

Statement of repairs required to be given by Surveyors.

If any difference of opinion arises between the Surveyors and the owners, manufacturers, or others, or any questions are raised, the facts should at once be reported to the officer authorized to grant a certificate of survey.

11. Surveyors are in no case to give a declaration either for the hull, machinery, boilers, or equipments of a steamer unless they are satisfied that all the requirements of the Act have been complied with.

Declaration not to be given without great caution.

It is the duty of the Surveyor to satisfy himself personally regarding every detail of the survey of a vessel, and not to trust to any certificate or other document given by any person not responsible to the Government.

12. In any case in which the Surveyor has reason to believe that the hull, machinery, boilers, or equipments are not fit for so long a time as the owner has applied for, he is to grant his declaration for such shorter period as he may deem expedient, informing the owners, if necessary, of his reasons for so doing. Unless it is the docking time only that limits his declaration, in accordance with the regulations, he is not to grant a declaration for an inland steamer for a shorter period than one month. In such cases, and also in cases in which the Surveyor refuses a declaration altogether, he is to give a statement in writing of the repairs he considers necessary to enable him to grant a declaration for the time asked. By this paragraph the Surveyor is to understand that an inland steamer that is not fit for a declaration for one month is not to be deemed by him as fit to hold a certificate at all.

Short declaration when to be granted.

13. It is most desirable that a Surveyor should complete the survey of a vessel in every detail when he has commenced it, and if possible, arrangements should always be made to secure this. In exceptional cases, however, when this cannot be arranged, one or more Surveyors should complete the parts of the survey left unfinished. The Surveyor who commenced the survey

Surveyor to complete survey where possible, but to sign only for details surveyed.

should not sign a declaration for any details which he has not surveyed, and for which consequently he is not prepared to hold himself personally responsible. He can only relieve himself from entire responsibility for every detail by distinctly noting on his declaration that he has been unable to attend to certain details specified by him, and in respect only of the details so specified will his claim to irresponsibility be accepted.

The Surveyor or Surveyors who attend to the details of the survey which have been left unfinished should also give declarations for the particulars they have attended to. The supplementary declaration should be attached to the main declaration.

Refusal of
declarations
to be notified.

14. A report should be made to the officer appointed to receive cancelled or suspended certificates of the name, port of registry, and official number of all vessels for which declarations are refused. This should be done as soon as possible after the vessel is withdrawn from survey, and full reasons for the refusal should be given.

A declaration for twelve months should not be granted whenever the Surveyor has any doubt whatever as to the efficiency of any part of the vessel, or her machinery, or equipments for such period.

EXAMINATION OF HULL, &c.

Hulls to be
examined.

15. Surveyors are to determine whether the hulls of inland steam-vessels are in good condition and fit for the service for which they are intended; and they are to examine the hulls of such vessels inside once at least in every year, at such time as is most convenient to the owners; and outside on a slip or in dry dock at least once every four years.

Owner should
give notice
when a vessel
is in dry dock.

16. Delays and inconvenience may to a great extent be prevented if notice is given by owners when a vessel, which requires a certificate, is undergoing repairs, or is in dry dock for any other purpose, as this notice might obviate the occasional necessity of re-docking a vessel at an inconvenient time. Surveyors should explain this to owners or their agents whenever an opportunity occurs.

New vessels to
be surveyed be-
fore being paint-
ed or cemented.

17. A survey made only after the hull is complete, and is cemented and painted, cannot be regarded as a satisfactory survey of a new steam vessel. Surveyors should therefore decline to grant declarations for any new steamer, unless they inspected her before she was painted or cemented. Any survey made while the vessel is being built is not to interfere with the complete inspection afterwards, but is to be made solely with a view of enabling the Surveyors to form an opinion of the workmanship, material, and construction.

The bottoms of new vessels need not be examined in dry dock after launching, if they have been examined by the Surveyor before launching, unless he has special reasons for considering it necessary.

Water-tight
collision bulk-
heads.
Other bulk-
heads.

18. A collision water-tight bulkhead should be fitted in all steamers. As regards bulkheads, the Surveyors should not refuse to grant a declaration upon the ground that they are not fitted, or are defective, unless they are of opinion that the want of, or the defective state of, the bulkheads renders the vessel unsafe.

Examination
of the bottom
outside.

19. In no case should a Surveyor grant a declaration for a steamer, the outside of the bottom of which has not been examined either on a slip way or in a dry dock by a Surveyor during the four years preceding the date of survey.

20. For examining the internal parts of the vessel, they should have parts of the ceiling removed, in order that they may ascertain the condition of the hull; they should also carefully examine the cement to ascertain its condition, and where they find it cracked or doubtful, they should extend their examination, and cause such a portion of the cement to be removed as may, in their judgment, be necessary to enable them to form a correct opinion as to the state of the vessel covered by the cement. The roses for the deck pumps, also those for the bilge pumps, should be taken out of the bilges and cleaned, and the sluices and cocks on the bulk-heads inspected and put in good working order.

Ceiling to be removed as Surveyor thinks necessary.

21. The Surveyors should examine very particularly the plating, stringers, frames, floors, &c., in the engine-room, boiler space, and coal bunkers, the bunkers of course being empty.

Examination of vessel in engine-room, coal bunkers, &c.

22. The date of the last outside inspection of the bottom is to be entered in the declaration, as it is from that date that the docking time is to count. If the hull is not passed at all, or not passed for the maximum time (12 months), the fact should be noted in the declaration for the vessel. The repairs which have been executed from time to time should be recorded in the office book.

Entries in book.

BOATS AND LIFE-BUOYS.

23. It will be the duty of the Surveyor to take care that all steam vessels are provided with the boats required by these rules, both as to number and cubic contents, and to see that they are efficient and in good order and ready for service, subject to the rules contained in these instructions.

Dimensions of boats.

Surveyors are not to insist upon the precise lengths, breadths, and depths inserted in the table, but are to approve of any efficient boats of sufficient strength, the cubic contents of which are respectively equal to, or greater than, the cubic contents of the boats specified in the table.

To ascertain the cubic capacity of a boat, measure the length and breadth outside and the depth inside. Multiply them together and by .6: the product is the capacity of the boat in cubic feet.

Rule for ascertaining the capacity of boats.

24. The Surveyors should see that in all boats the full complement of oars, including steering oar and two spare oars at least, are provided (in large boats more than two spare oars ought to be provided); that each boat has two plugs for each plughole, attached with lanyards and chains, and one set and a half of thole pins or crutches attached to the boat by sound lanyards; a bailer, a rudder and tiller, or yoke and yoke lines; painter of sufficient length, and a boat hook, the rudder and bailer to be attached to the boat by sufficiently long lanyards, and kept ready for use.

Requisites for use in boats.

BOAT SCALE.

Tons.	Tons.	Cubic capacity.
Vessels of 100 and under 200	one boat of 120 ft.	
" of 200 and upwards	two boats of 600 "	

25. As regards life-buoys. No life-buoy stuffed with rushes or with cork shavings or other shavings, or granulated cork, or any loose material should be passed. All cork life-buoys should be built of solid cork and fitted with life-lines and loops securely seized to the life-buoy, and none should be passed that will not float for 24 hours in water with 32 lb. of iron suspended from them. If life-buoys are not made of solid cork, then any other strong life-buoy of an approved pattern

Life-buoys, standard of.

may be passed that is capable of floating in the water for 24 hours with 40 lb. of iron suspended from it. No contrivance is to be passed as a life-buoy that requires inflation before use. Life-buoys with lines attached should be secured by a toggle and becket, or any other similar method, so that they can be quickly released; they must not be lashed nor seized to the rail or any other part of the vessel, but must be kept so as to be ready for use at a moment's notice in case of an emergency.

Steam-launches must carry two life-buoys: vessels other than steam-launches and carrying passengers should carry life-buoys in the ratio of three for every 100 passengers carried; the maximum number need not exceed 12.

Deck pumps
to be fitted.

26. There must be for each compartment a pump of sufficient size which can be worked from the upper deck. A rose or perforated box of sufficient size should be fitted at the end of the suction pipe of each pump, and means provided for clearing the end of the suction pipe. A trunk-way leading from the upper deck to the suction of each pump, large enough for a man to go down to the end of the suction pipe, is the best arrangement for this purpose. If portable pumps only are supplied, there must be a trunk-way left in each hatchway leading to the bottom of each compartment.

Deck pumps, when not worked by machinery, should have handles at least long enough for two men to work at them.

Helm
indicators.

27. In passing a helm indicator, the Surveyor should ascertain by actual trial that whenever the pointer moves to the word "port" on the dial or plate, wherever that word may be, it shows that the helm is ported, and, whenever the pointer points to the word "starboard," wherever that word may be, it means that the helm is starboarded.

Meaning of
port helm.

28. In the foregoing directions, it is assumed that "port helm" means that the helm is so moved as to turn the ship's head to the right, and "starboard helm" means that the helm is so moved as to turn the ship's head to the left.

The man at the helm should be so placed in steamers that frequent crowded harbours or rivers that he has a clear look-out ahead.

Lead and lines.

29. Inland steam vessels plying to places beyond thirty miles from Port of Survey must have on board two hand lead-lines of 25 fathoms each with leads of at least 7 lb. in weight each.

Anchors,
chains, cables,
hawsers,
warps, &c.

30. Surveyors must be very careful to see that each steam-vessel they survey is provided with chain cables and anchors duly certified under the Chain Cable Acts. When the stream and kedge anchors exceed 168 lb. in weight, they also must be tested in accordance with the same Acts. The Surveyors must also see that the chain cables and anchors on board are sufficient for the service and in good condition. The chain cables must be removed from the chain lockers at least once in 12 months, cleaned if necessary, and the pins knocked out of the shackles. The shackle pins should be secured by small pins of hard wood. The spare anchors should not be stowed below, but kept where they will be ready in case they are required. Proper hawsers and warps must also be supplied.

Compass to be
fitted.

31. Inland steam-vessels plying to places beyond thirty miles from Port of Survey shall be supplied with a compass properly fixed and adjusted.

Rocket lockers.

32. The locker for keeping the rockets, blue lights, &c., should not be air-tight, but should have sufficient

small safe openings to allow of the escape of any moisture generated: by this means the rockets, blue lights, &c., can be kept for a long period.

33. Vessels of 100 tons and upwards must be fitted with a steam fire pump; vessels of 200 tons and upwards must be supplied with a portable fire-engine in addition to the steam pump, suitable hose, and conductors, to be fitted; and in length sufficient to reach any part of the vessel. At least one fire-bucket to be carried for each of the crew. The fire-hoses should be connected stretched, to judge of their length, and thoroughly examined at every survey, and at least once a year (and at any other time that the Surveyor thinks it necessary) tested with the conductor in its place, by pumping water through them by the main or donkey engines at full speed. A proper conductor and metal bend or goose neck forms part of its equipment, and must be provided.

34. All decks and floors upon which passengers are carried must be caulked and properly secured. Sufficient light and ventilation must be provided. Proper and sufficient means of ingress and egress must be fitted.

35. In steamers making short daily runs, the clear space on the main deck, below the main deck or cabin and the bridge deck may be measured. The divisors being for the different decks as follows:—

Main deck	...	4.5 sq. ft. for each adult.
Below main deck		
or in cabin	...	9 " " "
Bridge deck	...	9 " " "

If the bridge deck be a continuous deck fore and aft and forms a permanent part of the structure of the vessel, and the vessel be sufficiently stable, it may be measured as the upper deck, in which case the decks below will be measured as below main decks at nine square feet for each adult.

For vessels making long voyages inland, and carrying coolies under the Inland Emigration Act, then the divisor will be nine square feet for each adult.

The upper or bridge deck is in no case to be measured, unless there be fitted a roof or sufficient protection from the sun, such as jaffery roof or awnings, that can be carried in all weathers.

36. All inland steam-vessels must be supplied with lights and fog signals in accordance with the rules for sea-going steam-ships. Small steam-launches may carry lights of a reduced size, but the Surveyor must satisfy himself as to their efficiency. A steam-whistle and a bell is to be supplied in every case. In small steamers the mechanical fog horn may be dispensed with.

BOILERS AND SUPERHEATERS.

37. In dealing with boilers that have been made in the United Kingdom, the Surveyor should accept the certificate of the Board of Trade as to pressure to be granted, provided the boilers have been made under the Board's inspection during construction and a test certificate granted by the Board of Trade is produced. In cases where no supervision or inspection has been made during construction the Surveyor should add the factor Y in the rule 44, and such other of the factors as may under the circumstances of the case appear necessary.

38. The Surveyor is required by the Act to fix the limits of weight to be placed on the safety valves of inland steam-vessels. The Surveyor having himself fixed the limits of the weight is then required to declare that in his judgment the boiler and machinery are

sufficient for the service intended, and in good condition, and that they will be sufficient for twelve months or such other period as he may, in his judgment, determine. For his guidance the following directions are given.

Working
pressure to be
fixed by
calculation.

39. The Surveyor should fix the working pressure for boilers by a series of calculations of the strength of the various parts and according to the workmanship and material. The Surveyors should therefore receive and report on any plans of boilers intended for inland steam-vessels that may be submitted in due course with the form of application and fees. They are not to report on any tracing or plan that is not accompanied by that form, or when they have reason to believe that the boilers, when finished, are not intended to be placed on board steamers that will require survey certificates. When the Surveyor has received plans and tracings of new boilers, or of alterations of boilers, and has approved of them, he will of course be careful in making his examinations from time to time to see that they are followed in construction. When he has not had the plans submitted, but is called in to survey a boiler, he will of course measure the parts, note the details of construction, and, if necessary, bore the plates to ascertain their thickness, &c., before he gives his declaration.

The Surveyor cannot declare a boiler to be safe unless he is fully informed as to its construction, material, and workmanship. He should therefore be very careful how he ventures to give a declaration for a boiler that he is not called in to survey until after it is completed and fixed in the ship.

Respecting
stays.

40. In the case of new boilers the Surveyors may allow a stress not exceeding 7,000lb. per square inch of net section on solid iron screwed stays and supporting flat surfaces, but the stress should not exceed 5,000lb. when the stays have been welded or worked in the fire.

The areas of diagonal stays are found in the following way:—Find the area of a direct stay needed to support the surface; multiply this area by the length of the diagonal stay, and divide the product by the length of a line drawn at right angles to the surface supported to the end of the diagonal stay; the quotient will be the area of the diagonal stay required.

When gusset stays are used, their area should be in excess of that found in the above way.

Girders for
flat surfaces.

41. When the tops of combustion boxes or other parts of a boiler are supported by solid rectangular girders, the following formula should be used for finding the working pressure to be allowed on the girders, assuming that they are not subjected to a greater temperature than the ordinary heat of steam; and in the case of combustion chambers, that the ends are fitted to the edges of the tube plate and the back plate of the combustion box:—

$$\frac{C \times d^2 \times T}{(W-P) D \times L} \quad \text{Working pressure.}$$

W = Width of combustion box in inches.

P = Pitch of supporting bolts in inches.

D = Distance between the girders from centre to centre in inches.

L = Length of girder in feet.

d = Depth of girder in inches.

T = Thickness of girder in inches.

C = 500 when the girder is fitted with one supporting bolt.

C = 750 when the girder is fitted with two or three supporting bolts.

$C = 850$ when the girder is fitted with four supporting bolts.

The working pressure for the supporting bolts and for the plate between them should be determined by the rule for ordinary stays.

42. The pressure on plates forming flat surfaces is found by the following formula :—

Flat surfaces of boilers.

$$\frac{C \times (T + 1)^2}{S - 6} = \text{Working pressure.}$$

T = Thickness of the plate in sixteenths of an inch.

S = Surface supported in square inches.

C = Constant according to the following circumstances.

$C = 100$ when the plates are not exposed to the impact of heat or flame, and the stays are fitted with nuts and washers, the latter being at least three times the diameter of the stay and two-thirds the thickness of the plates they cover.*

$C = 90$ when the plates are not exposed to the impact of heat or flame, and the stays are fitted with nuts only.

$C = 60$ when the plates are exposed to the impact of heat or flame, and steam in contact with the plates, and the stays fitted with nuts and washers, the latter being at least three times the diameter of the stay and two-thirds the thickness of the plate they cover.

$C = 54$ when the plates are exposed to the impact of heat or flame, and steam in contact with the plate, and the stays fitted with nuts only.

$C = 80$ when the plates are exposed to the impact of heat or flame, with water in contact with the plates, and the stays screwed into the plate and fitted with nuts.

$C = 60$ when the plates are exposed to the impact of heat or flame, with water in contact with the plate, and the stays screwed into the plate, having the ends riveted over to form a substantial head.

$C = 36$ when the plates are exposed to the impact of heat or flame, and steam in contact with the plates, with the stays screwed into the plate, and having the ends riveted over to form a substantial head.

When the riveted ends of screwed stays are much worn, or when the nuts are burned, the constants should be reduced; but the Surveyor must act according to the circumstances that present themselves at the time of survey; and it is expected that in cases where the riveted ends of screwed stays in the combustion boxes and furnaces are found in this state it will be often necessary to reduce the constant 60 to about 36.

The Surveyors should not in any case allow a greater compressive stress on the tube plates than is obtained by the following formula :—

Compressive stress on tube plates.

$$\frac{(D - d) \times 15000}{W \times D} = \text{Working pressure.}$$

D = least horizontal distance between centres of tubes in inches.

d = inside diameter of ordinary tubes in inches.

T = thickness of tube plate in inches.

* If the diameter of riveted washers be at least $\frac{3}{4}$ ds the pitch of the stays, and the thickness not less than the plates they cover, the constant may be increased to 150.

When doubling plates are fitted of the same thickness as the plates they cover, and not less in width than $\frac{3}{4}$ ds of the pitch of the stays, the constant may be increased to 100.

When doubling plates cover the whole of the flat surface, the case should be submitted for the consideration of the Board.

W = extreme width of combustion box in inches from front of tube plate to back of fire box, or distance between combustion box tube plates when boiler is double ended and the box common to the furnaces at both ends.

Wet-bottomed
boilers.

43. The Surveyors should take care that wet-bottomed boilers, the outside of the bottom of which cannot be seen, are lifted for inspection at least once in every four years, or oftener if the Surveyor considers it necessary. It will often be found necessary long before this to reduce the pressure, unless the boilers are lifted from their seats for the latter to judge of their efficiency. If the owners in any special case have any good reasons for not wishing to lift them when the Surveyor requires it, the Surveyor should submit the whole case to the officer authorised to grant certificates of survey. The Surveyor must recollect that he is not to certify as sufficient any boiler respecting which he cannot thoroughly satisfy himself. The Surveyor should record in the hydraulic test book the dates on which wet-bottomed boilers are inspected when lifted, and whether the boilers were out of the ship when examined, and if out of the ship where they were examined. Boilers which have been lifted should in all cases be subjected to the hydraulic test before they are re-set.

Cylindrical
boilers.

44. When cylindrical boilers are made of the best material with all the rivet holes drilled in place and all the seams fitted with double butt straps, each of at least $\frac{3}{8}$ the thickness of the plates they cover, and all the seams at least double riveted with rivets having an allowance of not more than 75 per cent. over the single shear, and provided that the boilers have been open to inspection during the whole period of construction, then five may be used as a factor of safety. The tensile strength of the iron is to be taken as equal to 47,000lb. per square inch with the grain, and 40,000lb. across the grain. But when the above conditions are not complied with, the additions in the following scale must be added to the factor 5, according to the circumstances of each case:—

A†	·15	To be added when all the holes are fair and good in the longitudinal seams, but drilled out of place after bending.
B†	·3	To be added when all the holes are fair and good in the longitudinal seams, but drilled out of place before bending.
C	3	To be added when all the holes are fair and good in the longitudinal seams, but punched after bending instead of drilled.
D	·5	To be added when all the holes are fair and good in the longitudinal seams, but punched before bending.
E*	·75	To be added when all the holes are not fair and good in the longitudinal seams.
F	·1	To be added if the holes are all fair and good in the circumferential seams, but drilled out of place after bending.
G†	·15	To be added if the holes are fair and good in the circumferential seams, but drilled before bending.
H	·15	To be added if the holes are fair and good in the circumferential seams, but punched after bending.

I†	·2	To be added if the holes are fair and good in the circumferential seams, but punched before bending.
J*	·2	To be added if the holes are not fair and good in the circumferential seams.
K	·2	To be added if double butt straps are not fitted to the longitudinal seams, and the said seams are lap and double riveted.
L	·1	To be added if double butt straps are not fitted to the longitudinal seam, and the said seams are lap and treble riveted.
M	·3	To be added if only single butt straps are fitted to the longitudinal seams, and the said seams are double riveted.
N	·15	To be added if only single butt straps are fitted to the longitudinal seams, and the said seams are treble riveted.
O	1	To be added when any description of joint in the longitudinal seams is single riveted.
P	·1	To be added if the circumferential seams are fitted with single butt straps and are double riveted.
Q	·2	To be added if the circumferential seams are fitted with single butt straps and are single riveted.
R	·1	To be added if the circumferential seams are fitted with double butt straps and are single riveted.
S††	·1	To be added if the circumferential seams are lap joints and are double riveted.
T	·2	To be added if the circumferential seams are lap joints and are single riveted.
U	·25	To be added when the circumferential seams are lap and the streaks of plates are not entirely under or over.
V‡	·3	To be added when the boiler is of such a length as to fire from both ends, or is of unusual length, such as flue boilers, and the circumferential seams are fitted as described opposite P, R, and S, but of course when the circumferential seams are as described opposite Q and T, V ·3 will become V ·4.
W*	·4	To be added if the seams are not properly crossed.
X*	·4	To be added when the iron is in any way doubtful, and the Surveyor is not satisfied that it is of the best quality.
Y†††	1·65	To be added if the boiler is not open to inspection during the whole period of its construction.

Where marked * the allowance may be increased still further if the workmanship or material is very doubtful or very unsatisfactory.

† When the holes are to be rimmed or bored out in place the case should be specially considered as to the reduction or omission of A, B, G, and I.

‡ When boilers are comparatively short the case should be specially considered as to the omission of V as heretofore.

†† When the circumferential seams are lapped and treble-riveted the case should be specially considered.

††† When surveying boilers that have not been open to inspection during construction, the case should be specially considered as to the factors to be used.

The strength of the joints is found by the following method :—

$$\frac{(\text{Pitch} - \text{Diameter of rivets}) \times 100}{\text{Pitch}} = \left\{ \begin{array}{l} \text{Percentage of} \\ \text{strength of} \\ \text{plate at joint} \\ \text{as compared} \\ \text{with the solid} \\ \text{plate.} \end{array} \right.$$

$$\frac{(\text{Area of rivets} \times \text{No. of rows of rivets}) \times 100}{\text{Pitch} \times \text{thickness of plate}} = \left\{ \begin{array}{l} \text{Percentage of strength of rivets as} \\ \text{compared with the solid plate.} \end{array} \right.$$

Then take iron as equal to 47,000lb. per square inch, and use the smaller of the two percentages as the strength of the joint, and adopt the factor of safety as found from the preceding scale—

$$(\text{47,000} \times \text{percentage of strength of joint}) \times \text{twice the thickness of the plate in inches.}$$

Inside diameter of the boiler in inches $\times$ factor of safety = { Pressure to be allowed per square inch on the safety valves

In the case of zig-zag riveting, the strength through the plate diagonally between the rivets is equal to that horizontally between the rivets, when diagonal pitch = $\frac{6}{5}$ horizontal pitch + $\frac{4}{5}$ diameter of rivet.

Plates that are drilled in place must be taken apart and the burr taken off, and the holes slightly countersunk from the outsides.

butt straps.

Butt straps must be cut from plates and not from bars, and must be of as good a quality as the shell plates, and for the longitudinal seams must be cut across the fibre. The rivet holes may be punched or drilled when the plates are punched or drilled out of place, but when drilled in place, must be taken apart and the burr taken off and slightly countersunk from the outside.

When single butt straps are used and the rivet holes in them punched they must be $\frac{1}{8}$ th thicker than the plates they cover.

* If the rivets are exposed to double shear, multiply the percentage as found by 75.

The diameter of the rivets must not be less than the thickness of the plates of which the shell is made; but it will be found when the plates are thin, or when lap joints or single butt straps are adopted, that the diameter of the rivets should be in excess of the thickness of the plates.

Dished ends must be stayed as flat surfaces; but when they are theoretically equal to the pressure needed, when considered as portions of spheres, the stays, when solid, may have a stress of 14,000lb. per square inch of net section, but the stress should not exceed 10,000lb. when the stays have been welded or worked in the fire.

Truely hemispherical ends subjected to internal pressure may be allowed double the pressure that is suitable for cylinder of the same diameter and thickness.

All man-holes and openings must be stiffened with compensating rings of at least the same effective sectional area as the plates cut out, and in no case should the plate rings be less in thickness than the plates to which they are attached. The openings in the shells of cylindrical boilers should have their shorter axes placed longitudinally. It is very desirable that the compensating rings round openings in flat surfaces be made of **L** or **T** iron. Cast iron doors are not to be passed.

The neutral part of boiler shells under steam domes must be efficiently stiffened and stayed, as serious accidents have arisen from the want of such precautions. The boilers must be tested by hydraulic pressure to twice the working pressure in the presence and to the satisfaction of the Surveyors.

45. Circular furnaces with the longitudinal joints welded or made with a butt strap:— Circular furnaces.

$90,000 \times \text{the square of the thickness of the plate in inches.}$

$(\text{Length in feet} + 1) \times \text{diameter in inches.}$

= working pressure per square inch, provided it does not exceed that found by the following formula:—

$$\frac{8000 \times \text{thickness in inches}}{\text{Diameter in inches}} = \left\{ \begin{array}{l} \text{Working pressure} \\ \text{per square inch.} \end{array} \right.$$

The second formula limits the crushing stress on the material to 4,000lb. per square inch.

The length is to be measured between the rings if the furnace is made with rings.

If the longitudinal joints instead of being butted are lap jointed in the ordinary way, then 70,000 is to be used instead of 90,000, excepting only where the lap is bevelled and so made as to give the flues the form of a true circle, when 80,000 may be used.

When the material or the workmanship is not of the best quality, the constants given above must be reduced, that is to say, the 90,000 will become 80,000; the 80,000 will become 70,000; the 70,000 will become 60,000; and when neither the material nor the workmanship are of the best quality, such constants will require to be further reduced, according to circumstances and the judgment of the Surveyor, as in the case of old boilers. One of the conditions of best workmanship is that the joints are either double riveted with single butt straps, or single riveted with double butt straps, and the holes drilled after the bending is done and when in place, and after-

wards taken apart, the burr on the holes taken off, and the holes slightly countersunk from the outside.*

The working pressure for corrugated furnaces, practically circular and machine-made, provided the plane parts at the ends do not exceed six inches in length, and the plates are not less than $\frac{1}{16}$ inch thick, should not be greater than found by the following formula:—

$$\frac{9000 \times \text{thickness in inches}}{\text{mean diameter in inches}} = \left\{ \begin{array}{l} \text{Working pressure per} \\ \text{square inch.} \end{array} \right.$$

When the furnaces are riveted in two or more lengths the case should be submitted for consideration, as it may be necessary to make a deduction.

Cylindrical
superheaters.

46. The strength of the joints of cylindrical superheaters and the factor of safety are found in a similar manner as for cylindrical boilers and steam receivers, but instead of using 47,000lb. as the tensile strength of iron 30,000lb. is adopted, unless where the heat or flame impinges at, or nearly at, right angles to the plate; then 22,400lb. is substituted.

When a superheater is constructed with a tube subject to external pressure, the working pressure should be ascertained by the rules given for circular furnaces, but the constants should be reduced as 30 to 47.

In all cases the internal steam pipes should be so fitted that the steam in flowing to them will pass over all the plates exposed to the impact of heat or flame.

Superheaters should, as regards survey, be deemed to be the *most important parts* of the boilers, and must be inspected *inside and outside*; those that cannot be entered on account of their size or arrangement must have a sufficient number of doors through which a thorough inspection of the whole of the interior can be made.

Special attention should be paid to the survey of superheaters, as, with high pressure, the plates may become dangerously weak, and not give any sound to indicate their state when tested with a hammer; the plates should therefore be occasionally drilled.

Before commencing the survey, it is prudent to question the Engineer Officers as to the tendency of boilers to flame. If flaming is a frequent occurrence, extra care must be taken in the survey, and in fixing the pressure to be allowed as the tensile strength of the plate, when heated, is often reduced to about four tons per square inch. Drain pipes must in all cases be fitted to superheaters, in which a collection of water in the bottom is possible.

* The following examples will serve to shew the application of the constants for the different cases that may arise:—

Furnaces with butt joints and drilled rivet holes.	90,000 where the longitudinal seams are welded.
	90,000 where the longitudinal seams are double riveted and fitted with single butt straps.
	80,000 where the longitudinal seams are single riveted and fitted with single butt straps.
	90,000 where the longitudinal seams are single riveted and fitted with double butt straps.
Furnaces with butt joints and punched rivet holes.	85,000 where the longitudinal seams are double riveted and fitted with single butt straps.
	75,000 where the longitudinal seams are single riveted and fitted with single butt straps.
	85,000 where the longitudinal seams are single riveted and fitted with double butt straps.
	80,000 where the longitudinal seams are double riveted and bevelled.
Furnaces with lapped joints and drilled rivet holes.	75,000 where the longitudinal seams are double riveted and not bevelled.
	70,000 where the longitudinal seams are single riveted and bevelled.
	65,000 where the longitudinal seams are single riveted and not bevelled.
	75,000 where the longitudinal seams are double riveted and bevelled.
Furnaces with lapped joints and punched rivet holes.	70,000 where the longitudinal seams are double riveted and not bevelled.
	65,000 where the longitudinal seams are single riveted and bevelled.
	60,000 where the longitudinal seams are single riveted and not bevelled.

In the case of upright fire boxes of donkey or similar boilers, 10 per cent. should be deducted from the constant given above, applicable to the respective classes of work.

47. Superheaters that can be shut off from the main boilers must be fitted with parliamentary safety valve of sufficient size, but the least size passed should be 3 inches diameter. Safety valve for superheaters.

The flat ends of all boilers, as far as the steam space extends, and the ends of superheaters, should be fitted with shield, or baffle plates, where exposed to the hot gases in the uptake; as all plates subjected to the direct impact of heat or flame are liable to get injured unless covered with water.

STEEL BOILERS.

48. As there is up to the present time a certain amount of uncertainty about the quality of steel no allowances can be given for steel over iron unless the plates, &c., have been tested and the conditions, as laid down in the following rules, be carried out. In cases where the boilers have been made in the United Kingdom, the Surveyors should accept the test certificate of the Board of Trade, if made under Board of Trade's supervision.

Owners cannot expect a Surveyor to give the full allowances for a steel boiler unless an opportunity has been afforded him of seeing that the material and workmanship are such as to warrant him in making such allowances.

49. The following should guide the Surveyors when the general quality of the steel has been found suitable for marine boilers.

The steel-makers or boiler-makers should test one or more strips cut from each plate for tensile strength and elongation, and stamp both results on a part of the plate, where they can be easily seen when the boiler is constructed. Maker's test.

The Surveyor is not obliged to witness the foregoing tests, although it is very desirable that he should, when his other duties will allow him to do so, but he should, however, select at least one in four of these plates, either at the steel works or the boiler-maker's works, and witness the testing of at least one strip cut from each selected plate. Surveyor's tests.

A few rivets of each size should be selected, and should be turned and tested for tensile stress. The tensile stress should be from 28 tons to 32 tons per square inch, with a contraction of area of about 60 per cent. Rivet tests.

If for the plates from which the Surveyor selects the above proportions a greater stress is wished than is allowed for iron, tests for tensile stress and elongation should be made, and those for which no reduction of thickness is asked may be tested for resistance to bending if preferred. Tensile and bending tests.

The breadth of test strips for tensile stress should be about two inches, and the elongation, taken in a length of ten inches, should be about 25 per cent., and not less than 20 per cent. The test strips must be carefully prepared and measured, and they should be cut from the plate by a planing or shaping machine. Test strips.

The bending tests for plates *not* exposed to flame should be made with strips in their normal condition; but strips cut from furnaces, combustion boxes, &c., should be heated to a cherry red, then plunged into water of about 80°, and kept there until of the same temperature as the water, and then bent. The bending strips should not be less than two inches broad and 10 inches long, and they should be bent until they break, or until the sides are parallel at the distance from each other of not less than (3) three times the thickness of plate. Bending tests.

Tensile stress,
&c.

The tensile stress of the plates *not* exposed to flame should be about 28 tons, and should not exceed 32 tons per square inch of section and 28 tons should be the stress used in the calculations for cylindrical shells if the plate comply with all the conditions as stated herein; but when the minimum tensile stress of shell plates exceeds 28 tons, and allowance is wished for the excess, the case should be specially submitted for the consideration of Government. The tensile stress of furnace flanging and combustion box plates should range from 26 tons to 30 tons per square inch.

Annealing.

All plates that are punched, flanged, or locally heated must be carefully annealed after being so treated.

Perforating and
annealing.

The rivet holes in the furnaces and longitudinal seams of cylindrical shells should be *drilled*; but if it is wished to punch them, and afterwards bore or anneal the plates in a proper furnace, the proposed method of the punching and boring or annealing should be submitted for consideration before being done; but all punched holes should be made after bending.

In all cases where assent has been given for plates to be punched after bending and then annealed, the makers should stamp the plates with the words "punched after bending and then annealed," and in all cases where assent has been given for punching and afterwards boring plates, the words "punched and then bored" should be stamped on the plates.

Stress on stays.

Bars for stays should be tested. Solid steel screwed stays which have not been welded or otherwise worked after heating may be allowed a working stress of 9,000lb per square inch of net section, provided the tensile stress is from 28 to 32 tons per square inch, and the elongation in 10 inches about 25 per cent. and not less than 20 per cent. Steel stays which have been welded or worked in the fire have been found to be unreliable, therefore they should not be passed.

Constants for
flat surfaces.

If the flanging plates and those exposed to flame comply with the foregoing conditions, the constant in the rules for iron boilers may be increased as follows:—

The constants for flat surfaces when they are supported by stays screwed into the plate and riveted 10 per cent.

The constants for flat surfaces when they are supported by stays screwed into the plate and nutted, or when the stays are nutted in the steam space, 25 per cent. This is also applicable to the constants for flat surfaces stiffened by riveted washers or doubling strips and supported by nutted stays.

Furnaces, plane
and corrugated.

The constants for combustion box girders 10 per cent. The furnace constants about 10 per cent. when plane. When new corrugated and machine-made, and practically true circles, the working pressure is found by the following formula, provided that the plane parts at the ends do not exceed 6 inches in length, and the plates are not less than $\frac{5}{16}$ inch thick:—

$$\frac{12500 \times T}{D} = \text{working pressure.}$$

T = thickness in inches.

D = mean diameter in inches.

(If the furnace is riveted in two or more lengths, the case should be submitted for consideration.)

Compressive
stress on tube
plates.

A greater compressive stress should not be allowed on tube plates than found by the following formula:—

$$\frac{(D-d) T \times 20000}{W \times D} = \text{working pressure.}$$

D = least horizontal distances between centres of tubes in inches.

d = inside diameter of tubes in inches.

T = thickness of tube plate in inches.

W=extreme width of combustion box in inches from front of tube plate to back of fire box, or distance between combustion box tube plates when boiler is double-ended and the box common to the furnaces at both ends.

The rivet section, if of iron, in the longitudinal seams of cylindrical shells, where lapped and at least double riveted, should not be less than $\frac{1}{3}$ times the net plate section; but if steel rivets are used, their section should be at least $\frac{2}{3}$ of the net section of the plate, if the tensile stress of the rivets is not less than 28 tons and not more than 32 tons per square inch. Therefore in calculating the working pressure the percentage strength of the rivets may be found in the usual way by the foregoing rules, but in the case of iron rivets, the percentage found should be divided by $\frac{1}{3}$, and in the case of steel rivets by $\frac{2}{3}$, the result being the percentages required. If the percentage strength of the rivets by calculation is less than the calculated percentage strength of the plate, calculate the working pressure by both percentages. When using the percentage strength of the plate, use the nominal factor of safety suitable for the method of construction, as by the rules for iron boilers; but when using the percentage strength of rivets, use 5 as the factor of safety. The less of the two pressures so found is the working pressure to be allowed for the cylindrical portion of the shell.

Plate and rivet section.

Local heating of the plates should be avoided, as many plates have failed from having been so treated.

Local heating to be avoided.

Steel plates which have been welded should not be passed if subjected to a tensile stress, and those welded and subject to a compressive stress should be efficiently annealed.

Welding, &c

In other respects the boilers should comply with the rules for iron boilers.

If the tests are to be made at the steel works, the boiler-makers should inform the Surveyors in their district when and where they will be made, so that the Surveyor from the nearest district to the steel works may be instructed to attend to them. The Surveyor should have due notice two or three days when the plates, &c., will be ready for the test pieces to be cut from them. (Surveyors should report all cases of failures of steel plates, &c., which may come to their knowledge).

When steel is used in superheaters, or in the uptakes of boilers, the parts where the flame impinges at or nearly at right angles to the plate must be protected with baffle plates; but in all cases steel should be discouraged for this purpose.

Steel for superheaters &c.

This applies to the unshielded uptakes of all boilers, including ordinary vertical donkey boilers.

50. When the steel is not to be made by any of the following makers, the case will receive the special consideration of the Government, and this should be specially noted by the Surveyors:—

Makers of steel

Messrs. Beardmore.

" J. Brown & Co.

" C. Cammell & Co.

Mr. D. Colville.

The Landore Steel Company.

The Leeds Forge Company.

The Steel Company of Scotland.

The Weardale Iron and Coal Company.

The West Cumberland Iron and Steel Company.

51. Difficulty has been experienced with regard to the survey of steel boilers, owing to the fact that some makers were not aware, at the time the boilers

Boiler, naming &c.

were commenced, that a survey certificate would be necessary, and the makers have therefore omitted to submit tracings until the boilers have been nearly completed. Tracings of boilers may therefore be received for examination upon payment of the usual fee of Rs. 50, and the Surveyors may proceed as far as witnessing the hydraulic test before any further instalment of the survey fee is paid. Engineers and boiler-makers should be advised of this arrangement.

BOILERS, GENERAL.

- Donkey boilers.** 52. Donkey boilers that are in any way attached to, or connected with, the main boilers, or with the machinery used for propelling the vessel, must be surveyed and be fitted the same way as the main boilers, and have a water and steam gauge, and all other fittings complete, and, as regards safety valves, must comply with the same regulations as the main boilers.
- Stop valves.** 53. No boiler or steam chamber is to be so constructed, fitted, or arranged so that the escape of steam from it through the safety valve required by these rules can be wholly or partially intercepted by the action of any other valve.
- A stop valve must always be fitted between the boiler and the steam pipe, and, where two or more boilers are connected with a steam receiver or superheater, between each boiler and the superheater or steam receiver. The object of this is obvious, viz. to avoid the failure of all the boilers through the failure of one. The necks of stop valves should be as short as practicable.
- Gauges, &c.** 54. Each boiler must be fitted with a glass water-gauge, at least two test cocks, and steam-gauge; that is to say, each boiler must be fitted with all fittings as complete as if there were only one boiler. Boilers that fire both ends, and those of unusual width, must have water-gauges and test cocks at each end or side, as the case may be. When a steamer has more than one boiler, and these boilers are fitted with stop valves each boiler must be treated as a separate one, and have all the requisite fittings.
- Boilers to be tested when too small to enter.** 55. When the boilers are not large enough for the Surveyors to get into, they should see them tested by hydraulic pressure at every annual survey at least. The hydraulic test should also be applied at every intermediate survey if the Surveyor considers it necessary. In the case of old boilers the Surveyors must use their own judgment as to the necessary pressure to be applied. This is in no way to interfere with the instructions to test all new boilers to double their working pressure, nor with the proper internal examination of all boilers that are large enough for the Surveyors to get into.
- Whenever it is only stays that prevent getting in he may order their removal, and he must see them properly replaced before granting his declaration.
- Surveyors not to go into hot boilers.** 56. If the boiler is too hot for the Surveyor to examine the inside efficiently, and with safety and convenience, he should decline to examine the boiler, and absolutely refuse to grant a declaration, until he can make an efficient internal examination.
- Strength of boilers to be ascertained, and working pressure fixed by calculation.** 57. Before testing a boiler, the Surveyor should examine it, take the necessary measurements, and calculate what the working pressure should be in accordance with the regulations, and only test to double the working pressure; if the test is not satisfactory the defects must be made good, and the boiler re-tested.

This instruction applies to superheaters and steam chests as well as to boilers.

The Surveyor who grants the declaration must examine the boilers thoroughly, and will be held responsible for the pressure allowed.

58. Surveyors should see all new boilers, and boilers that have been taken out of the ship for a thorough repair, tested by hydraulic pressure up to at least double the working pressure that will be allowed previous to the boilers being placed in the vessel, to test the workmanship, &c.; but the working pressure is to be determined by the strength of stays, thickness of plates, and strength of riveting, &c., and not by the hydraulic test. Hydraulic test.

The hydraulic test should in no case exceed twice the calculated working pressure of the boiler, and it is never to be applied until the boiler has been examined in accordance with paragraph 57 and until the strength has been calculated from the necessary measurements taken from the boiler itself.

When the boilers are in the vessel the Surveyor may, at any time he thinks it necessary, before he gives a declaration, have them tested by hydraulic pressure to satisfy himself as to any doubtful part, or of places not easy of access, care being taken in the case of old boilers not to overstrain them; but the test must always exceed the working pressure.

Surveyors should pay particular attention to the examination and testing of steam pipes.

The hydraulic test should be applied to the boilers of all steamers that have not previously had a survey certificate before a declaration is granted for them.

The amount of the hydraulic pressure test and the date on which it was applied to the boilers should be inserted in the Surveyor's declaration and recorded in the office boiler book.

59. In all boilers in which the Surveyors find that cast iron is employed in such a manner as to be subject to the pressure of steam or water, great care must be taken. Cast iron must not be used for stays, and Surveyors should also discourage the use of cast iron for chocks and saddles for boilers. Particular attention should be paid to the chocking of boilers, more especially when they are fired athwartships. Cast iron in boilers and steam pipes.

60. A pressure once allowed on the boiler of an inland steam-vessel is not to be increased unless, in cases where a Surveyor is of opinion that an increased pressure may with safety be allowed, he has communicated with the Surveyor who last surveyed the vessel; and on learning the reasons why the existing pressure was formerly allowed, the Surveyor is of opinion that it may be increased. Pressure fixed by one Surveyor not to be increased by another.

60A. Before granting a declaration or certificate of survey for a steam-vessel where the boilers and machinery are in charge of a native driver, the surveyor should require the production of a certificate either from the Superintending Engineer or from some respectable engineering firm to the effect that the pressure gauges on the boiler or boilers have been overhauled and adjusted and are in proper order.

SAFETY VALVES.

61. Every inland steam vessel shall be provided with a safety valve upon each boiler, so constructed as to be out of the control of the Engineer when the steam is up, and if such valve is in addition to the ordinary valve, it shall be so constructed as to have an area not less, and a pressure not greater, than the area of and pressure on that valve. Provisions of the Act as regards safety valves.

The Surveyors are instructed that in all *new boilers*, and whenever *alterations can be easily made*, the valve chest should be placed directly on the boiler; and the neck, or part between the chest and the flange which is bolted on to the boiler, should be as short as possible and be cast in one with the chest.

The Surveyors should note that it is not intended by this instruction that vessels with old boilers which have been previously passed with such an arrangement should be detained for the alterations to be carried out.

Of course in any case in which a Surveyor is of opinion that it is positively dangerous to have a length of pipe between the boilers and the safety valve chest, it is his duty at once to insist on the requisite alterations being made before granting a declaration.

If any person places an undue weight on the safety valve of *any* steam ship, or increases such weight beyond the limits fixed by the Engineer-Surveyor, he shall, in addition to any other liabilities he may incur by so doing incur a penalty not exceeding one thousand rupees.

The Engineer-Surveyor shall declare, amongst other things, the limits of the weight to be placed on the safety valves; that the safety valves are such, and in such condition as required by these rules, and that the machinery is sufficient for the service for the time he fixes, and is in good condition for that time.

area of safety
valves.

62. The area of Government safety valves, or (when there is more than one) the combined area of the Government safety valves should be not less per square foot of fire grate surface than that given in the following table opposite the boiler pressure intended, provided the valve is not less than three inches in diameter, or where there are two valves the diameter is not less than two inches for each valve.

When, however, the valves are of the common description, and are made in accordance with the tables, it will be necessary to fit them with springs having great elasticity, or to provide other means to keep the accumulation within moderate limits.

If there is only one safety valve on a main boiler, the Surveyor should not grant a declaration without first referring the case to Government for special instructions.

In the case of small boilers, such as launch boilers, if it is wished to fit valves smaller than three inches diameter, the case should be submitted for the consideration of Government.

Safety valve areas.

Boiler pressure.	Area of valve per square foot of fire-grate.	Boiler pressure.	Area of valve per square foot of fire-grate.	Boiler pressure.	Area of valve per square foot of fire-grate.
lb.	Sq. Inch.	lb.	Sq. Inch.	lb.	Sq. Inch.
15	1'250	77	407	139	243
16	1'209	78	403	140	241
17	1'171	79	398	141	240
18	1'136	80	394	142	239
19	1'102	81	390	143	237
20	1'071	82	386	144	235
21	1'041	83	382	145	234
22	1'013	84	378	146	232
23	986	85	375	147	231
24	961	86	371	148	230
25	937	87	367	149	228
26	914	88	364	150	227
27	892	89	360	151	225
28	872	90	357	152	224
29	852	91	353	153	223
30	833	92	350	154	221
31	815	93	347	155	220
32	797	94	344	156	219
33	781	95	340	157	218
34	765	96	337	158	216
35	750	97	334	159	215
36	735	98	331	160	214
37	721	99	328	161	213
38	707	100	326	162	211
39	694	101	323	163	210
40	681	102	320	164	209
41	669	103	317	165	208
42	657	104	315	166	207
43	646	105	312	167	206
44	635	106	309	168	204
45	625	107	307	169	203
46	614	108	304	170	202
47	604	109	302	171	201
48	595	110	300	172	200
49	585	111	297	173	199
50	576	112	295	174	198
51	568	113	292	175	197
52	559	114	290	176	196
53	551	115	288	177	195
54	543	116	286	178	194
55	535	117	284	179	193
56	528	118	281	180	192
57	520	119	279	181	191
58	513	120	277	182	190
59	506	121	275	183	189
60	500	122	273	184	188
61	493	123	271	185	187
62	487	124	269	186	186
63	480	125	267	187	185
64	474	126	265	188	184
65	468	127	264	189	183
66	462	128	262	190	182
67	457	129	260	191	181
68	451	130	258	192	181
69	446	131	256	193	180
70	441	132	255	194	179
71	436	133	253	195	178
72	431	134	251	196	177
73	426	135	250	197	176
74	421	136	248	198	176
75	416	137	246	199	175
76	412	138	245	200	174

63. The Surveyor in his examination of the machinery and boilers is particularly to direct his attention to the safety valves, and whenever he considers it necessary, he is to satisfy himself as to the pressure on the boiler by actual trial. Examination of safety valve

The Surveyor is to fix the limits of the weights to be placed on the safety valves, and the responsibility of not issuing a declaration before he is fully satisfied on the point is very grave. The law places on the Surveyors the responsibility of "declaring" that the boilers are in his judgment sufficient with the weights he states.

The Surveyor is to examine the whole of the valves, weights, and springs at every survey.

64. When the Surveyor has determined the amount of pressure, he is to see the valves weighted accordingly, and the weights or springs fixed in such a manner as to preclude the possibility of their shifting or in any way increasing the pressure. The limits of the weight on the valves is to be inserted in the declaration, and should it at any time come to a Surveyor's knowledge that the weights or the loading of the valve have been shifted, or otherwise altered, or that the Surveyor see Valves weighted.

valve has been in any way interfered with, so as to increase the pressure, he is at once to report the facts to Government.

Spring safety-valves.

65. If the following conditions are complied with, the Surveyor need raise no question as to the substitution of spring loaded valves for dead weighted valves:—

- (1) That at least two separate valves are fitted to each boiler, except in the case of donkey or other small boilers, in which the grate surface does not exceed 14 square feet, in which case a single safety valve may be passed, provided it is not less than three inches in diameter.
- (2) That the valves are of the proper size.
- (3) That the spring and valve be so cased in that it cannot be tampered with.
- (4) That provision be made to prevent the valve flying off in case of the spring breaking.
- (5) That the requisite safety valve area is cased in the usual manner of Government valves.
- (6) That screw lifting gear be provided to ease all the valves as by paragraph .
- (7) That the size of the steel of which the spring is made is to be found by the following formula:—

$$\sqrt[3]{\frac{s \times D}{c}} = d.$$

s = the load on the spring in lb.

D = the diameter of the spring (from centre the centre of wire) in inches.

d = the diameter or side of square of the wire in inches.

c = 8,000 for round steel.

c = 11,000 for square steel.

- (8) That the springs be protected from the steam and impurities issuing from the valves.
- (9) That when valves are loaded by direct springs, that the compressing screw abuts against a metal stop or washer, when the load sanctioned by the Surveyor is on the valve.

In no case is the Surveyor to give a declaration for a spring loaded valve, unless he has examined it and is acquainted with the details of its construction, and unless he has tried it under full steam and full firing for at least 20 minutes with the feed-water and stop valve shut off. If the accumulation of pressure exceeds 10 per cent. of the loaded pressure, he should not give his declaration.

Owners, masters, and Engineers to see that valves are kept in proper order.

66. It is clearly the duty of the masters and engineers of vessels to see, in the intervals between the surveys, that the Government safety valve or valves, as well as the other safety valves and the rest of the machinery, are in proper working order. There is no provision in the Inland Steam-vessels Act, exempting the owner of any vessel, on the ground that she has been surveyed, from any liability, civil or criminal, to which he would otherwise be subject. The Government safety valve is to be out of the control of the engineers when the steam is up; this enactment, far from implying that he is not to have access to it, and to see to its working at proper intervals when the vessel is in port, rather implies the contrary; and the master should take care that the engineer has access to it for that purpose. A substantial lock, that cannot be easily tampered with, and as far as possible weather-proof, should be used for locking up the safety-valve boxes.

67. In witnessing the hydraulic tests of boilers, &c., and in witnessing all safety valve tests for accumulation of pressure, the Surveyors are to use the pressure gauges supplied to them for the purpose.

All tests for pressure and accumulation are to be made with proper gauges.

MACHINERY, &c.

68. The machinery to be surveyed comprises the engines and boilers used for propelling the vessel, and all the machinery connected therewith. The boilers of donkey engines are to be surveyed with the boilers and machinery of the vessel, when they are in any way connected with them.

What machinery is to be surveyed.

69. Surveyors should, before granting declarations for any period exceeding six months, be careful when examining the machinery—(1) to have the upper brasses of all bearings taken off; (2) the shaft turned round and carefully examined; (3) the cylinder covers and junk rings lifted for examination of the pistons and cylinders; (4) the slide covers or bonnets removed for examination of the slides, and if necessary, the slides taken out; (5) the air and circulating pump covers lifted for examination of the pump buckets and valves; (6) the covers of all feed and bilge pump valves removed for the examination of the valves; (7) all discharge valves and sea-cocks taken out for examination; (8) the propeller shaft to be drawn when necessary, and it and the screw to be examined, and in all cases in which the shaft is drawn, it is to be seen again after the screw is secured in its place; (9) the bridges and fire bars to be removed to permit of a thorough examination of the boilers and furnaces; (10) all cocks and valves on the boilers to be taken out and examined.

When to be taken to pieces for examination.

When a Surveyor has seen the machinery of a new steamer in the shop before it was put together, and is satisfied with it, it will not be necessary to have it again opened up on board the ship on the first survey for examination, unless in the Surveyor's judgment it is necessary after the vessel has been tried under steam.

It will rest with owners to determine whether or not they will have a certificate for any period exceeding six months; but if they do so determine, then the above instructions are to be complied with before a declaration is granted.

The above instructions are also to apply at least once a year to the survey of all inland steam vessels, whatever may be the period for which the declarations are given. The examination of sea cocks and outside connections can be made when the vessel is in dry dock or beached.

After the examination of the parts has been made as above, the machinery must, when the Surveyors consider it necessary, be tried under steam at full pressure.

70. In the examination of the machinery and boilers the Surveyor should in no case give a declaration without thoroughly satisfying himself that both the boilers and the machinery are sufficient for the service intended, and in good condition.

Examination to be carefully made.

71. The boilers of all new sea-going vessels, passenger tugs, and other small passenger vessels should be fitted with separate feeding arrangements in addition to, but unconnected with, the main feed pipes and valves. In very small vessels an efficient hand pump, instead of the donkey pump, may be passed if the Surveyor has satisfied himself as to its efficiency when steam is up, and provided there are

Separate feed arrangements to be fitted.

separate feed pipes and valves as directed above. This instruction is to apply also in the case of old vessels of the above description, when being fitted with new boilers.

The Surveyors should discourage the practice of using the same pump for the bilges and for feeding boilers.

Cocks, valves,
and pipes.

72. All inlets or outlets in the bottom or side of a vessel near to, at, or below the deep load water-line other than the outlets of watercloset, soil, scupper, lavatory, and urinal pipes must have cocks or valves fitted between the pipes and the ship's side or bottom; such cocks or valves must be attached to the skin of the ship, and be so arranged that they can be easily and expeditiously opened or closed at any time; and the cocks, valves, and the whole length of the pipes should be accessible at all times.

Guards on
blow-off cocks.

With a view to the prevention of accidents to boilers through the blow-off cocks being left open after the boiler is run up, and to prevent water getting accidentally or intentionally into the ship by cocks being left open, and also to prevent the donkey engine becoming useless when used for feeding the boilers, all blow-off cocks and sea connections are to be fitted with a guard over the plug, with a featherway in the same, and a key on the spanner, so that the spanner cannot be taken out unless the plug or cock is closed. One cock is to be fitted to the boiler, and another cock on the skin of the ship or on the side of the Kingston valve.

Non-return
valves to pipes.

73. In all cases where pipes are so led or placed that water can run from the boiler or the sea into the bilge, either by accidentally or intentionally leaving a cock or valve open, they should be fitted with a non-return valve and a screw not attached, but which will set the valve down in its seat when necessary; the only exception to this is the firemen's ash cock, which should have a cock or valve on the vessel's side, and be above the stock-hole plates.

Cocks or valves standing exceptional distances from the vessel's plating, that is, where the necks are longer than is necessary for making the joint, are to be discouraged, and if passed, they should be made of brass or gun-metal, and well bracketed.

Non-return
valves on feed
cocks.

74. Where the feed cock or valve is so placed and arranged that more than one boiler can be fed at the same time through this cock or valve, a non-return valve must be fitted between each boiler and this cock or valve; but it is very desirable that all feed cocks or valves should have a non-return valve fitted between the boiler and the cock or valve.

ACCIDENTS AND DAMAGES.

Damage to
be inspected.

75. In all cases in which an inland steamer has sustained damage from any accident, or other cause, affecting her seaworthiness or efficiency in any part of her hull, equipments, or machinery, the Surveyors of the port, where the vessel may be, are to go on board and ascertain the extent of the damage. In doing so they will take care not to make any change in the position or condition of things on board, which would be at all likely to affect any legal evidence, should an enquiry into the case afterwards be considered necessary. It is extremely important that the vessel should be surveyed and a report forwarded as early as possible. In this report the Surveyors are to state whether the vessel is rendered inefficient or unsafe either in hull or machinery; and whether, in their opinion, the certificate should be cancelled or only temporarily withdrawn.

76. If, in consequence of any accident to an inland steamer, or for any other reason, the Surveyor considers it necessary to require the vessel to be taken into dock for the purpose of surveying the hull thereof, he may do so, but he is to be cautious never to exercise this power unless the circumstances of the case actually require it.

Surveyor may order vessel to be docked or beached.

77. Unless directions to the contrary are given the Surveyor is to hold the certificate of the vessel during the time she is under repair, and for this purpose he is to require it of the master, unless the damage is such that, in the Surveyor's judgment, the certificate should be cancelled, in which case he should forward it with his report to the officer appointed by Government to issue the certificates of survey. In all cases of serious damage the certificates should be cancelled.

Certificate to be held during repairs.

78. When the vessel is in every respect rendered seaworthy and efficient, both in hull and machinery, to the entire satisfaction of the Surveyor, he is to put an endorsement on the back of the certificate and duplicate, if they have not previously been cancelled, to the effect that the damage has been made good so as to last for the period for which the certificate was granted, and return the certificate to the master or owner, or his agent, and allow the vessel to proceed.

Certificate may be endorsed if it has not been cancelled.

MISCELLANEOUS.

79. Surveyors of inland steam vessels are to state in the certificate the number and size of passenger flats or barges that may be towed by the vessel when carrying passengers on a river with reference to her towing capacity and ability to control them with safety in the tides of the river navigated.

80. No passenger shall be disembarked otherwise than at a proper landing stage or in suitable boats without his own consent.

81. Inland steamers towing boats of any kind carrying passengers shall have two towing lines fast to the bow of each boat.



No. _____

CERTIFICATE OF SURVEY

Issued under Act VI of 1884 of the Governor-General in Council by the Government of Bengal,
For an Inland Steam Vessel.

TO REMAIN IN FORCE ONLY UNTIL THE _____ DAY OF _____ 188 .

INLAND STEAMER

Owner, Managing Owner, or Agent _____

Port of Registry and Official Number.	Register Tonnage.	Name of Master and Number of his Certificate.

Limits beyond which this vessel is not to ply.

NUMBER OF PASSENGERS

This Ship is, according to the declaration of the Shipwright Surveyor, fit to carry,
WHEN THERE IS NO INCUMBRANCE OF PASSENGER ACCOMMODATION:—

Deck Passengers.	Second Cabin Passengers.	Saloon Passengers.	Total Passengers.
Tween Deck ...			
Main " ...			
Upper " or Bridge			
Total ...			

Two Children under 12 years of age to be reckoned as one passenger.

If the
Space measured for Passenger Accommodation
is occupied by Cattle, or by Cargo, or other articles,

Then for every 4½ superficial feet of such
space so occupied on the upper deck
and for every nine superficial feet of
such space so occupied on the lower
deck or in the cabins.

One Passenger

Is to be deducted from the numbers above
stated.

BOATS, LIFE-BUOYS, AND EQUIPMENTS.

Required to be carried by this Ship.

Boats.	Life-Buoys and Equipments.
Boats	A Fire Hose capable of being connected with the engine, and sufficient length to be used in any part of the vessel.
	A Safety Valve on each boiler, out of the control of any person board, except the Master, when the steam is up.
1 Boat ... { of the aggregate capacity of } cubic feet.	Compass and _____ Life-Buoys fit and ready for use.

THIS IS TO CERTIFY that the provisions of the law with respect to the survey of the above-mentioned Steam
Ship, and the transmission of Declarations in respect thereof, have been complied with.

Signed by order of the Government of Bengal,
This _____ 188 .

Examined and Registered,

{ Vice-Chairman to the Commissioners for making
Improvements in the Port of Calcutta.

This Certificate, unless previously cancelled or revoked, to be in force until the _____ day of _____ 188 .
If the Vessel is then out of a port of survey, she must be surveyed and have a new Certificate before she first begins to
ply after her next subsequent return to a port of survey.

Either this Certificate, or the Duplicate thereof, furnished by the Government of Bengal, is to be put up in a con-
spicuous part of the Vessel, where it will be visible to all persons on board the same.

If the number of passengers carried exceeds the number stated in this Certificate, the Master or Owner will be liable
to the penalty prescribed in the Acts of the Indian Council.

In case of any accident occasioning loss of life, or any material damage affecting the seaworthiness or efficiency of the vessel, either in
the hull or in any part of the machinery, a report by letter, signed by the Owner or Master, is to be forwarded to the Port Commissioners within
24 hours after the happening of the accident, or as soon thereafter as possible.

N.B.—Any communication addressed to the Government of Bengal relative to this Vessel should state the Name, Port of Registry, and
Official Number of the Vessel, and the Number of this Certificate.

1	Name of steam vessel, and official No.	2	Tonnage.	3	When and where built and material.	4	Power, nominal.	5	Description of engines, and m/o.	6	Description of boilers, and m/o.	7	Load on safety valves per square inch.	8	Ground tackle.	9	Condition of hull.	10	General equipment.	11	Name of master and number of officers and deck crew, and of engine-room crew.	12	Name of first engineer, and description of certificate and number.	13	When and where last examined in dry dock.	14	Examine (if any) beyond which the vessel is not fit to ply.	15	Time, if less than one year, for which the hull, boilers, engines, or any of the equipments will be sufficient.	16	Dimensions of boats.	17	Capacity for carrying passengers.
Official No. _____		Tons. _____		Horse Power. _____		Main boilers _____ lbs.		Auxiliary do. _____ lbs.		Master _____ No. of certificate _____		1st Mate _____ No. _____		No. of Officers _____ No. of deck crew _____		1st Engineer _____ No. of certificate _____		2nd do. _____ No. _____		No. of Engineers _____ No. of E. R. crew _____		For the year ending _____ day of _____ 188 _____		Length.		Breadth.		Depth.		Cubic capacity.			
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Deck Passengers.		Second Cabin Passengers.		Saloon Passengers.		Total Passengers.		Tween Deck ...		Main " ...		Upper " or Bridge		Total ...																			

I hereby declare as follows, viz.—

- (1) That on the day of 188 I inspected the hull of the steamer named in the space, marked column 1, in this form, and the boats, life-buoys, lights, signals, and other equipments on board the same, and the certificates of the master and mate.
- (2) That the hull of the said ship is sufficient for the service intended and is in good condition.
- (3) That the boats, life-buoys, lights, and signals, on board the said steamer, and the certificates of the master and mate are such and in such condition as required by the rules under Act VI of 1884.
- (4) That the hull of the said steamer and the equipments before named will, in my judgment, be sufficient until the day of next.
- (5) That the said steamer is, in my judgment, fit to ply as an inland steamer with the number of passengers stated in the space, marked column 17, in this form, when there is no encumbrance of the space measured for the passenger accommodation; but is not fit to ply with a greater number of passengers.
- (6) That on the date first above named I inspected the machinery of the said steamer and all the safety-valves and fire-hose on board the same.
- (7) That the machinery of the said steamer is sufficient for the service intended, and in good condition.
- (8) That the said machinery will, in my judgment, be sufficient until the date fourth above named.
- (9) That the safety-valves and fire-hose are such and in such condition as required by the rules under Act VI of 1884.
- (10) That the weight to be placed on the safety-valves in the said steamer is not to exceed the "pressure per square inch in lbs" stated in column 7 in this form, and that such weight has been placed on them accordingly.
- (11) That the certificate or certificates of the engineer or engineers is or are such and in such condition as required by the rules under Act VI of 1884.
- (12) That the said steamer as regards her machinery is, in my judgment, fit to ply as an inland steam-vessel.

DATED AT

This

day of

188

}
.

*Engineer and Shipwright Surveyor to the Government
of Bengal.*

UNDER the powers conferred upon him by section 50, clause (1) of Act VI of 1884 (the Inland Steam-vessels Act), and with the previous sanction of the Governor-General in Council, the Lieutenant-Governor is pleased to make the following rules for the protection of inland steam-vessels from danger by explosion or fire:—

I.—Every inland passenger steamer shall be provided with sufficient hose to reach from her engines to her stem and taffrail, and shall be supplied with fire-buckets in the proportion of one for each of the crew, which shall be kept in a place where they are at once available.

II.—Fire-engines shall be placed under the charge of an officer who should be held responsible that they are ready for immediate use.

III.—Inland steamers shall, before proceeding on a voyage, have all their cargo, and that of any flats they may be towing, safely stowed, and in the case of hay or other inflammable material, shall have the same properly covered with tarpaulins or other sufficient protection.

IV.—Before starting, passengers shall be called on to deliver up any gunpowder, or any inflammable articles.

V.—No naked lights shall be used in the hold or on the cargo-deck, or in the passengers' cabins or accommodation.

VI.—The officers and crew are to be divided into parties and assigned stations in case of fire.

VII.—Petroleum shall not be carried by inland passenger steamers in larger quantities than 100 cases, to be stowed apart from other cargo, and as far from the stoke-holds as possible.

VIII.—Fire shall only be permitted in galleys properly constructed for the purpose, and no gunpowder or other explosive shall be allowed to be carried unless in a suitably constructed magazine compartment. And no fire is to be permitted on board any flat or steamer while taking in or discharging gunpowder.

IX.—The tops of the boiler and galley funnels of all inland steamers must be fitted with spark-catchers.

X.—Any person committing a breach of these rules shall be punished with imprisonment or a term which may extend to six months, or with fine which may extend to five hundred rupees, or with both.

UNDER the powers conferred upon him by section 51, clause (1) of Act VI of 1884 (the Inland Steam-vessels Act), and with the previous sanction of the Governor-General in Council, the Lieutenant-Governor is pleased to make the following rules to regulate the carriage of passengers in inland steam-vessels:—

The master of any inland steam-vessel may refuse to receive on board thereof any person who, by reason of drunkenness or otherwise, is in such a state, or misconducts himself in such a manner, as to cause annoyance to other passengers on board, or, if such person is on board, may put him on shore at any convenient place; and no person so refused admittance or put on shore shall be entitled to the return of any fare he may have paid.

The following offenders, that is to say—

- (1) Any person who, being drunken or disorderly, has been on that account refused admission into any duly surveyed inland steam-vessel by the owner or any person in his employ, and who, after having had the amount of his fare (if he has paid the same) returned or tendered to him, nevertheless persists in attempting to enter such steamer;
- (2) Any person who, being drunken or disorderly on board any such steamer, is requested by the owner or any person in his employ to leave the same at any place at which he can conveniently so do, and who, having had the amount of his fare (if he has paid the same) returned or tendered to him, refuses to comply with such request;
- (3) Any person on board any such steamer who, after warning by the master or any other officer of the steamer, molests or continues to molest any passenger;
- (4) Any person who, after having been refused admission into any such steamer by the owner or any person in his employ on account of such steamer being full, and who after having had the full amount of his fare (if he has paid the same) returned or tendered to him, nevertheless persists in attempting to enter the same;
- (5) Any person having got on board any such steamer, who upon being requested on the like account by the owner or any person in his employ to leave such steamer before the same has quitted the place at which such person got on board, and who, upon having the full amount of his fare (if he has paid the same) returned or tendered to him, refuses to comply with such request;
- (6) Any person who travels or attempts to travel in any such steamer without having previously paid his fare, and with intent to avoid payment thereof;

- (7) Any person who, having paid his fare for a certain distance, knowingly and wilfully proceeds in any such steamer beyond such distance without previously paying the additional fare for the additional distance, and with intent to avoid payment thereof;
 - (8) Any person who knowingly and wilfully refuses or neglects, on arriving at the point to which he has paid his fare, to quit any such steamer; and
 - (9) Any person on board any such steamer who does not, when required by the master or other officer of such steamer, either pay his fare or exhibit such ticket or other receipt (if any) showing the payment of his fare as is usually given to persons travelling by and paying their fare for such steamer.
- shall, for every such offence, be liable on conviction before a Magistrate to a penalty not exceeding Rs. 20; but such liability shall not prejudice the recovery of any fare payable by him.

[Second Publication.]

NOTICE.

The 6th November 1885.—The following draft of Rules, which it is proposed to issue under section 24 of Act VII of 1884, is published for general information. These rules will be taken into consideration on the expiry of a month from the date of their first publication in the *Calcutta Gazette*; and the Lieutenant-Governor will receive and give due attention to any objections or suggestions which may be made by any person within that period.

J. WARE EDGAR,

Offg. Secy. to the Govt. of Bengal.

UNDER the powers conferred upon him by section 24 of Act VII of 1884 (the Indian Steam-Ships Act), and with the previous sanction of the Governor-General in Council, the Lieutenant-Governor has been pleased to make the following rules for the survey of steam-ships:—

1. Surveys shall be made at the Port of Calcutta upon due notice or application from the owner, on any day in the year, with the exception of Sundays and Government holidays, by the Surveyor to the Port Commissioners. Certificates of survey shall be given in the form hereunto annexed by the Vice-Chairman to the Port Commissioners, on payment of the fee specified in the schedule to the Act. Time and place of surveys.
2. The Surveyors will be guided by the rules hereunto annexed in making their survey. In cases where two Surveyors are employed, the Engineer-Surveyor will survey the engines, boilers, and all the machinery required to be surveyed under the Act. The Shipwright Surveyor will inspect the hull equipments and passenger accommodation, measure and determine the number of passengers the vessel is fit to carry, and see that the certificates of the master, mates, and engineers are such as is required by the Act, also that the lights and fog signals are in accordance with the regulations for the prevention of collisions at sea. Surveyors' duties.
3. Owners of steam vessels requiring survey are to give the Surveyor at least three days' notice in writing when a survey is required, and should such notice fail to be given, he (the Surveyor) is not responsible for any delay or inconvenience which may occur in consequence. Notice of survey to be given.
4. This notice (which is to be preserved by the Surveyor) must state explicitly the name of the steamer to be surveyed, and the time when, and place at which, she will be ready for inspection. Particulars to be given in notice.
5. In order to prevent inconvenience and delay to the owners, the Surveyors are to be careful to be in attendance at the appointed time and place. Should they be unable to attend as required, notice should be given to the owners to that effect. Surveyors to attend at appointed time.
6. Should a steamer not be ready for inspection at the time arranged, the Surveyors may make such arrangements for the subsequent survey as may be convenient to the owner or his agent. All expenses arising out of this postponement will be charged against the owner when the certificate is issued. Survey if deferred.

SURVEYORS' DECLARATIONS.

7. The Surveyor's declaration under section 11 of the Act shall be made in the form hereunto annexed. The particulars required to be given in the declaration for a certificate of survey are the following, which are treated of under separate heads:— Surveyors' declarations.

- (1.) That the hull of the ship is sufficient for the service intended, and in good condition.
- (2.) That the boats, life-buoys, lights, signals, compasses, and shelter for deck passengers, and the certificates of the master, and mate or mates, engineer or engineers, or engine-driver are such and in such condition as required by any law for the time being in force.
- (3.) The time (if less than 12 months) for which the said hull and equipments will be sufficient.

(4.) The limits (if any) beyond which, as regards the hull and equipments, the ship is in the Surveyor's judgment not fit to ply.

(5.) The number of passengers which the ship is, in the Surveyor's judgment, fit to carry, distinguishing if necessary between the respective numbers to be carried on deck, and in the cabins and in different parts of the deck and cabins, such numbers to be subject to such conditions and variations according to the time of the year, the nature of the voyage, the cargo carried, and other circumstances as the case requires.

The declarations of the Surveyor as to the boilers and machinery is to contain a statement of the following particulars:—

(1.) That the machinery of the ship is sufficient for the service intended, and is in good condition.

(2.) The time (12 months or less) for which such machinery will be sufficient.

(3.) That the safety valves and fire hose are such, and in such condition, as are required by the Act, and the rules framed thereunder.

(4.) The limits of the weight to be placed on the safety valves.

(5.) The limits (if any) beyond which as regards the machinery, the ship is, in the Surveyor's judgment, not fit to ply.

When a Surveyor is, from any reason whatever, unable to complete his declaration, an incomplete declaration should be sent to those who applied for survey as soon as possible, stating in it the reasons for not being able to fill up all the particulars under the various heading. He must take care to obliterate all the items in this declaration that he is unable to certify to as being in accordance with the Acts and regulations.

Surveyors may go on board ships.

8. Surveyors may go on board any ship at any reasonable time for the purpose of inspecting, either the certificates of the master, mates, or engineers, or the vessel, the machinery, the boats, other equipments, or for any other purpose rendered necessary by the Acts; and the owners, masters, mates, and engineers of steam-ships are required by the Act to give to the Surveyors, on being requested so to do, all such information and assistance within their power as may be requisite for the purpose of making the returns required by the Acts. In the performance of this part of their duties, Surveyors are to be careful to avoid impeding the duty of the vessel, or wilfully giving offence to any of the officers. If they should be hindered or vexatiously obstructed by any person in the performance of their duties, they should by no means mark it by personal resentment, but should communicate the facts without delay to the proper authorities, by whom the case will be taken up, if necessary.

Inspection to be made in the presence of owner, agent, or responsible person.

9. Surveyors should, if possible, make their inspections when the agent, master, or chief mate, and engineer of the vessel are present. Repairs can then be required, and defects can be pointed out to the proper persons without incurring the uncertainty and delay attendant upon messages delivered to the subordinate officers. If the owners do not regard the survey as being of sufficient importance to instruct a responsible representative to be present, the Surveyors will of course make the survey in his absence.

10. In order to prevent mistakes as to the nature and extent of repairs required by the Surveyors, whenever they cannot give a declaration until repairs are effected or alterations made, a written statement of the nature and extent of the defects to be remedied or alterations required should in all cases be given to the owner or agent, whether applied for by him or not. A copy of the above should always be taken in the office Press Letter Book. If any difference of opinion arises between the Surveyors and the owners, manufacturers, or others, or any questions are raised, the facts should at once be reported.

Statement of repairs required to be given by Surveyors.

11. Surveyors are in no case to give a declaration either for the hull, machinery, boilers, or equipments of a steamer unless they are satisfied that all the requirements of the law have been complied with.

Declaration not to be given without great caution.

It is the duty of the Surveyor to satisfy himself personally regarding every detail of the survey of a vessel, and not to trust to any certificate or other document given by any person not responsible to the Government. This instruction does not of course apply to certificates of compass adjustment.

12. In any case in which the Surveyor has reason to believe that the hull, machinery, boilers, or equipments are not fit for so long a time as the owner has applied for, he is to grant his declaration for such shorter period as he may deem expedient, informing the owners, if necessary, of his reasons for so doing. Unless it is the docking time only that limits his declaration, or the latest date for which an excursion certificate can be granted in accordance with the regulations, he is not to grant a declaration for sea-going steamers for less than a period of three months. In such cases, also in cases in which the Surveyor refuses a declaration altogether, he is to give a statement in writing of the repairs he considers necessary to enable him to grant a declaration for the time asked. By this paragraph the Surveyor is to understand that a sea-going steam ship that is not fit for a declaration for three months is not to be deemed by him as fit to hold a certificate at all.

Short declaration when to be granted.

13. It is most desirable that a Surveyor should complete the survey of a vessel in every detail when he has commenced it, and if possible, arrangements should always be made to secure this. In exceptional cases, however, when this cannot be arranged, one or more Surveyors should complete the parts of the survey left unfinished. The Surveyor who commenced the survey should not sign a declaration for any details which he has not surveyed, and for which consequently he is not prepared to hold himself personally responsible. He can only relieve himself from entire responsibility for every detail by distinctly noting on his declaration that he has been unable to attend to certain details specified by him, and in respect only of the details so specified will his claim to irresponsibility be accepted. The Surveyor or Surveyors who attend to the details of the survey which have been left unfinished should also give declarations for the particulars they have attended to. The supplementary declaration should be attached to the main declaration.

Surveyor to complete survey where possible, but to sign only for details surveyed. Declarations to be in such form as the Government may direct.

14. A report should be made to the Local Government of the name, port of registry, and official number of all vessels for which declarations are refused. This should be done as soon as possible after the vessel is withdrawn from survey, and full reasons for the refusal should be given. A declaration for twelve months should not be granted whenever the Surveyor has any doubt whatever as to the efficiency of any part of the vessel, or her machinery, or equipments for such period.

Refusal of declaration to be notified.

The object of rule 14 is to enable the Local Government to communicate to other Local Governments notice that declarations have been refused to such vessels.

EXAMINATION OF HULL, &c.

Hulls to be
examined.

15. Surveyors are to determine whether the hulls of sea-going vessels are in good condition and fit for the service for which they are intended; and they are to examine the hulls of such vessels outside and inside once at least in every year, at such time as is most convenient to the owners.

Owner should
give notice
when a vessel
is in dry dock.

16. Delays and inconvenience may to a great extent be prevented if notice is given by owners when a vessel, which requires a certificate, is undergoing repairs, or is in dry dock for any other purpose, as this notice might obviate the occasional necessity of re-docking a vessel at an inconvenient time. Surveyors should explain this to owners or their agents whenever an opportunity occurs.

New ships to be
surveyed before
being painted
or cemented.

17. The Government cannot regard as a satisfactory survey of a new steam ship a survey made only after the hull is complete, and is cemented and painted. Surveyors are therefore instructed to decline to grant declarations for any new steamer, unless they inspected her before she was painted or cemented. Any survey made while the vessel is being built is not to interfere with the complete inspection afterwards, but is to be made solely with a view of enabling the Surveyors to form an opinion of the workmanship, material, and construction.

The bottoms of new vessels need not be examined in dry dock after launching, if they have been examined by the Surveyor before launching, unless he has special reasons for considering it necessary.

Water-tight
collision bulk-
heads and
water-tight
compartment
round stern
tube of screw
shaft.
Other bulk-
heads.

18. A collision water-tight bulkhead, also an after water-tight compartment to cover the stern tube to the screw shaft, must be fitted in all sea-going steamers, both new and old. As regards other bulkheads, the Surveyors should not refuse to grant a declaration upon the ground that they are not fitted, or are defective, unless they are of opinion that the want of, or the defective state of, the bulkheads renders the ship unseaworthy.

As to screw
tunnels.

19. It is necessary that the screw tunnels of all iron passenger steam vessels should be made of iron, and should be strongly constructed and water-tight, with a stuffing-box round the shaft at the forward end. If there are manholes or openings in the floor, care must be taken that all are efficiently fitted with covers or doors, so arranged that they can easily and rapidly be made water-tight. If means are provided for entering the tunnel by a separate opening abaft the engine-room bulkhead, the passage down from the upper deck must be strongly constructed of iron, perfectly secure, and water-tight. In some cases the inside of an iron mast serves for this purpose. Cocks, or valves, and pipes must be fitted to let the water off the floor of the tunnel, and must be made to open or shut from the upper or main deck. If there is an opening through the engine-room bulkhead into the tunnel, a properly constructed water-tight door should be fitted to it, arrangements being made that it can be easily opened or shut from the upper or main-deck. In vessels which have already received Surveyor's certificates, this regulation need not be enforced if there be an effective arrangement of water-tight bulkheads, decks, floors, and stuffing-boxes, which will so confine any water entering the ship from the aftermost stuffing-box as to prevent it from finding its way into the ship in such quantity as will interfere with her safety.

Examination
of the bottom
outside.

20. In no case should a Surveyor grant a declaration for a steamer the outside of the bottom of which has not been examined by a Surveyor during the twelve months preceding the date of survey, and in no case should a declaration be granted for a longer period than a period terminating within twelve months

from the date of the last outside examination. For instance, if a steamer be examined outside on the 1st of January, she will (if the law be complied with) be entitled to a certificate for twelve months (*i.e.*, until the 1st of January following). But supposing the survey is not completed until the 1st of February, the Surveyor is (if the vessel be fit) to grant his declaration for a period ending the 1st of January following and no longer, unless the vessel be re-docked for examination.

21. The Surveyors, before granting a declaration for twelve months, should be careful to make a thorough examination of the outside of the bottom of the ship in a dry dock, after it has been cleaned. They should examine the pintles and braces of the rudder, as well as the bearings of the screw shaft and the different openings, valves, bolt-heads, &c., in the ship's bottom. All bolts, connecting cocks, valves, or pipes to the skin of the ship should have the heads outside, and such heads should be either countersunk or cupheaded. All discharge valves and sea-cocks should be taken out for examination while the vessel is in dry dock. Before Surveyors finally pass the hull of a vessel they are to see it fit to go into the water.

Examination of bottom to be made before painted. Cocks, &c., to be examined in dry dock.

22. For examining the internal parts of the ship, they should have parts of the ceiling removed, in order that they may ascertain the condition of the ship; they should also carefully examine the cement to ascertain its condition, and where they find it cracked or doubtful, they should extend their examination, and cause such a portion of the cement to be removed as may, in their judgment, be necessary to enable them to form a correct opinion as to the state of the ship covered by the cement. The roses for the deck pumps, also those for the bilge pumps, should be taken out of the bilges and cleaned, and the sluices and cocks on the bulkheads inspected and put in good working order.

Ceiling to be removed as Surveyor thinks necessary.

23. The Surveyors should examine very particularly the plating, stringers, frames, floors, &c., in the engine-room, boiler space, and coal bunkers, the bunkers of course being empty.

Examination of vessel in engine-room, coal bunkers, &c.

24. The date of the last outside inspection of the bottom is to be entered in the declaration, as it is from that date that the docking time is to count. If the hull is not passed at all, or not passed for the maximum time (twelve months), the fact should be noted in the declaration for the vessel. The repairs which have been executed from time to time should be recorded in the office book.

Entries in office book.

25. The height of the coamings round all openings in the main deck, and the means provided for securely protecting or fastening down all skylights, bunker openings, &c., as well as the sufficiency of the water, ports and scuppers for relieving the decks of water, are important items to be noted by the Surveyors in sea-going vessels coming under their survey. All side-lights should be fitted with deadlights, and all stern and other ports fitted in such a manner that they can be quickly and efficiently secured. All openings below the weather-deck in sea-going steam and sailing vessels carrying passengers or emigrants, whether such weather-deck be a poop, awning-deck, spar-deck, or forecastle, must be fitted with gratings or hatch covers, and tarpaulins, and also with means for effectually securing the tarpaulins down, and making the openings watertight. Such gratings or hatch covers must be kept and secured in a suitable place, at all times accessible and near to the openings for which they are intended. Many casualties happen through the engine-room skylights, coamings, companions, &c., being of light construction and insufficiently secured, instead of being of sufficient strength to form permanent parts of the

As to coamings skylights, scuppers, ports, gratings, &c.

structure of the ship; casualties also arise through the fronts of poops and bridge-houses being weak and insufficiently secured. The fore and aft beams or "strong backs," in the hatchways and the hatches themselves are often too weak to bear the pressure of water which may find its way on to them in a heavy sea. The Surveyors should in granting declarations for passenger steamers look especially to these points, and should in like manner, in the case of ships other than passenger steamers, look to these amongst other points when reporting a ship for detention as unsafe.

BOATS AND LIFE-BUOYS.

Dimensions of
boats.

26. It will be the duty of the Surveyor to take care that all steam ships are provided with the boats or rafts required by the law for the time being in force, both as to number and cubic contents; and to see that they are efficient, and in good order and ready for service, subject to the rules contained in these instructions. Surveyors are not to insist upon the precise lengths, breadths, and depths inserted in the table, but are to approve of any efficient boats of sufficient strength, the cubic contents of which are respectively equal to, or greater than, the cubic contents of the boats specified in the table laid down in rule.

If the smaller number of boats required by the law for the time being in force is carried, one of them must be a launch of at least the capacity named in column 2 of the said table.

If the larger number of boats is carried, the cubic contents (equal in their aggregate to the cubic contents required by law) may be spread in any way over the whole number of boats.

Rule for ascer-
taining the
capacity of
boats.

27. To ascertain the cubic capacity of a boat. Measure the length and breadth outside and the depth inside. Multiply them together and by '6; the product is the capacity of the boat in cubic feet. Thus, a boat 28 feet long, 8 ft 6 ins. broad, and 3 ft. 6 ins. deep will be regarded as having a capacity of $28 \times 8.5 \times 3.5 \times .6 = 499.8$, or 500 cubic feet. If the oars are pulled in rowlocks the bottom of the rowlock is to be considered the gunwale of the boat for ascertaining her depth.

As to life-
boats.

28. A life-boat, fitted with efficient and substantial air casings, is deemed to be capable of carrying one adult for every 10 cubic feet of her capacity. Thus a life-boat measuring $28 \times 8.5 \times 3.5$, whose cubic contents by the present rule are 500 cubic feet, is deemed to be sufficient for 50 adult persons. The space in the boat must be sufficient for the seating of the persons carried in it, and for the proper use of the oars.

Air cases.

29. No boat should be passed as a life-boat unless she has for every person she carries, or, what is the same thing, for every 10 cubic feet computed as above, at least one and a half cubic feet of strong and serviceable inclosed air-tight compartments, so constructed, fitted, and arranged that water cannot find its way into them. That is to say, the life-boat measuring $28 \times 8.5 \times 3.5$, whose whole cubic contents are 500 cubic feet, and which is deemed to be sufficient for 50 adults, is to have 75 cubic feet occupied by inclosed air cases.

Zinc is not permitted in the construction of a life-boat or her air cases, neither is copper to be used if the boat is built of iron.

If the boat is built of wood, copper of a good substance is of course a good material for the air cases, but the Surveyor should not insist upon it being employed; if used he should see that it is not too thin, as cases have occurred in which air cases have been

made of sheet copper not much thicker than tin foil, and the fraud has escaped detection at the time.

If the air cases are made of galvanised iron, care should be taken that the galvanising is well done, as otherwise it is nearly as bad as zinc.

The air-tight compartments or cases must be so distributed as to give the boat good buoyancy and stability, whether a part of the air cases should be under thwarts, or whether they should be all in the ends, or along the sides, will, so long as an efficient life-boat is obtained, be left to the option of the owner. If air cases are in the bottom of the boat, the depth of the boat is to be measured from the top of the bottom air cases. It is desirable that the coverings in the boats over the air cases be secured with screws or otherwise so as to enable the cases to be removed without difficulty for examination.

Spaces filled with or containing any material are not to be deemed air spaces.

No boat fitted with a steam-engine is to be passed as a life-boat.

No life-boat other than a metal one should be passed if carried sufficiently near the funnel as to be injuriously affected by the heat therefrom.

30. Life-boats should be built whale-boat fashion, Build. both ends alike. They should have a sheer of about three-quarters of an inch to a foot, rising equally from the midships to the stem and stern, and they should be made buoyant in accordance with the preceding instructions. A square-sterned boat is not to be passed as a life-boat, and, excepting in small boats, the oars should be double-banked.

31. In sea-going vessels a boat's compass must be Compasses. supplied for each of the life-boats required.

32. As regards requisites for use. All boats Boats to be hung in davits. Requisites for use in boats. should be hung in davits and kept ready for service at any moment. The Surveyors should see that in all boats the full complement of oars, including steering oar and two spare oars at least, are provided (in large boats more than two spare oars ought to be provided); that each boat has two plugs for each plughole, attached with lanyards or chains, and one set and a half of thole pins or crutches attached to the boat by sound lanyards; a bailer, a rudder and tiller, or yoke and yoke lines; a painter of sufficient length, and a boat hook, the rudder and bailer to be attached to the boat by sufficiently long lanyards, and kept ready for use. Means for speedily detaching the boats from the Lowering gear lower blocks of the davit tackles should be insisted upon; an ordinary fixed hook in the lower block shipping into a fixed eye in the boat should not be allowed. Surveyors should also see that the davits are strong enough, that they are so spaced that the boats can be swung out without unnecessary labour, that the boats' chocks can be expeditiously removed, and that the boats will not foul the ship's side in lowering when the ship has no list, and that the whole of the tackling, including davits, falls, blocks, eye-bolts, and rings, &c., is of sufficient strength to lower the boat, with its full complement on board, into the water. The boat's falls must be long enough to lower the boat into the water when the vessel is light. Life-lines should be fitted to the davits long enough to reach the water, when the vessel is light, and allowance made for the extreme roll of the ship.

Surveyors are to refuse declarations in cases in which the foregoing instructions are not fully carried out, but it is to be left to shipowners themselves to provide such methods as they please for lowering the boats, so long as the intention of the Legislature is complied with.

All the boats should be seen lowered into the water at every survey.

Equipments of
life-boats.

33. In the case of life-boats, the Surveyor should see that the hatchet or tomahawk, which is to be kept in each end of each life-boat, is in good order, and attached with a lanyard, and that a mast or masts, with at least one good sail and proper gear for each, and a life-jacket or life-belt for each oarsman and one for the coxswain is also provided; a life-line in loops should run round the outside of the boat and be securely made fast.

Life-jackets
standard of.

34. No life-jacket or belt should be passed that is not capable of floating in the water for 24 hours with 23 lb of iron suspended from it; and to ensure this buoyancy a life-jacket, in which the cork must be exposed and have a canvas back and straps only, should weigh 5 lb when dry.

Life-buoys,
standard of.

35. As regards life-buoys. No life-buoy stuffed with rushes or with cork shavings or other shavings, or granulated cork, or any loose material should be passed. All cork life-buoys should be built of solid cork and fitted with life-lines and loops securely seized to the life-buoy, and none should be passed that will not float for 24 hours in water with 32 lb of iron suspended from them. If life-buoys are not made of solid cork, then any other strong life-buoy of an approved pattern may be passed that is capable of floating in the water for 24 hours with 40 lb of iron suspended from it. No contrivance is to be passed as a life-buoy that requires inflation before use. Life-buoys with lines attached should be secured by a toggle and becket, or any other similar method, so that they can be quickly released; they must not be lashed nor seized to the rail or any other part of the vessel, but must be kept so as to be ready for use at a moment's notice in case of an emergency.

Life-buoys should in all cases be carefully examined by the Surveyor, who will satisfy himself of the buoyancy, and see that the materials of which they are composed have not become sodden, and that the lines attached to them are sufficient. Surveyors are to call the attention of owners and masters to the penalties imposed for not keeping the boats and efficient life-buoys in constant readiness for use.

Steam-
launches.

36. As regards steam-launches or boats fitted with steam power, the contents taken up in the boat by the engine and boiler are not to be deemed part of the clear contents of the boat. The boilers of steam-launches should, as regards fittings and strength, comply with the same regulations as the main boilers. As regards the safety valves fitted to the boilers of steam-launches, and of other boats carried by sea-going steamers, the Surveyors should see that they are out of the control of the engineer when steam is up, and comply with the same rules as the safety valves on the main boilers. The lifting or easing gear, for the valve should actually lift the valve and not merely the weight. The boilers should also have a steam-gauge, a glass water-gauge, and test cocks.

As to boats
already passed.

37. In carrying these instructions into effect, Surveyors are to be careful not to interfere unduly with life-boats passed before April 1884, provided their buoyancy and efficiency are equal or nearly equal to that indicated above; but in the case of new boats coming under survey for the first time, as well as in all cases in which the fittings of the boats require renewal, the rules contained in these instructions are to be strictly adhered to, whilst the Surveyors are to be careful not to interfere so as to condemn apparatus that may have been already passed, and that still remains efficient.

38. Table of the dimensions of boats required to be carried by passenger steamers under the Merchant Shipping Act.

Number of tons registered.	Either						Or					
	Number of boats.	Dimensions.			Factor.	Cubic contents.	Number of boats.	Dimensions.			Factor.	Cubic contents.
		Length.	Breadth.	Depth.				Length.	Breadth.	Depth.		
1,000 and upwards.	1	ft. in.	ft. in.	ft. in.	'6	Pt.	1	ft. in.	ft. in.	ft. in.	'6	ft.
	2	18 0	5 6	2 3	'6	133'7	2	18 0	5 6	2 3	'6	133'7
	3	24 0	5 6	2 6	'6	396'0	3	24 0	5 6	2 6	'6	396'0
	4	27 0	5 6	3 8	'6	504'0	4	22 0	5 6	2 6	'6	363'0
800 to 1,000	2 Life	28 0	8 6	3 6	'6	1034'6	2 Life	28 0	8 6	3 6	'6	892'7
	3					999'6	3					999'6
	4 Boats of					2034'2	4 Boats of					1892'3
	5						5					
500 to 800	1	18 0	5 6	2 3	'6	133'7	1	18 0	5 6	2 3	'6	133'7
	2	24 0	5 6	2 6	'6	396'0	2	24 0	5 6	2 6	'6	396'0
	1 Life	26 0	8 0	3 8	'6	457'6	1	22 0	5 6	2 6	'6	363'0
	4 Boats of					1132'1	4 Boats of					1637'5
300 to 500	1	18 0	5 6	2 3	'6	133'7	1	18 0	5 6	2 3	'6	133'7
	2	24 0	5 6	2 6	'6	396'0	2	24 0	5 6	2 6	'6	396'0
	1 Life	26 0	8 0	3 8	'6	457'6	1	22 0	5 6	2 6	'6	363'0
	4 Boats of					987'3	4 Boats of					892'7
240 to 300	1	16 0	5 6	2 3	'6	118'8	1	16 0	5 6	2 3	'6	118'8
	2	24 0	5 6	2 6	'6	396'0	2	24 0	5 6	2 6	'6	396'0
	1 Life	25 0	7 0	3 6	'6	367'5	1	22 0	5 6	2 6	'6	363'0
	4 Boats of					882'3	4 Boats of					877'8
120 to 240	1	16 0	6 6	2 3	'6	118'8	1	16 0	5 6	2 3	'6	118'8
	2	22 0	5 6	2 5	'6	175'4	2	22 0	5 6	2 5	'6	175'4
	1 Life	22 0	6 6	3 3	'6	278'9	1	22 0	5 6	2 6	'6	363'0
	3 Boats of					573'1	3 Boats of					657'2
60 to 120	1	14 0	5	2 2	'6	91'0	1	14 0	5 0	2 2	'6	91'0
	1 Life	20 0	6	3 0	'6	216'0	1	22 0	5 6	2 6	'6	363'0
	2 Boats of					307'0	2 Boats of					454'0
	3						3					
Under 60	1	14 0	5 0	2 2	'6	91'0	1	14 0	5 0	2 2	'6	91'0
	1 Life	16 0	5 6	2 9	'6	145'2	1	18 0	5 6	2 4	'6	277'2
	2 Boats of					236'2	2 Boats of					368'2
	3						3					

If the number of boats in this column are carried, one of them must be a launch of at least the capacity named.

If the number of boats in this column are carried, their cubic contents (equal in the aggregate to the cubic contents required) may be spread in any way over the whole number of boats. The life-boat or life-boats must be the largest boats.

38a. Before granting a declaration or certificate of survey for a steam vessel, where the boilers and machinery are in charge of a native driver, the Surveyor should require the production of a certificate either from the Superintending Engineer or from some respectable engineering firm, to the effect that the pressure gauges on the boiler or boilers have been overhauled and adjusted and are in proper order.

MISCELLANEOUS.

39. As a general rule, if sea-going steamers are fitted with sufficient sail power to enable them to work as sailing vessels in the event of their machinery becoming disabled, no question need be raised. They should of course be provided with sufficient spare sails to be kept on board. All the sails must be examined by the Surveyors, who must at every survey be perfectly satisfied with their efficiency, as also with that of the standing and running gear.

40. The compasses of every sea-going steam ship employed to carry passengers must be properly adjusted from time to time; such adjustment, in the case of ships surveyed as herein mentioned, to be made to the satisfaction of the Surveyor, and according to such regulations as may be issued by the Government.

The Surveyor should satisfy himself as to the proficiency of the person whose signature is attached to the adjustment certificate in question.

Sail power.

Compasses to be adjusted to Surveyor satisfaction.

Standard
compass.

41. Every foreign-going iron or composite built ship should have a standard compass fitted with the means of taking accurate bearings, and a table of errors for this compass should be furnished by the master.

Certificate of
master and
mate to be
taken in
certain cases.

42. In other cases the Surveyor should act as follows, viz.—

The Surveyor should, before he grants his declaration, receive a certificate from the owners to the following effect, viz.—“We the undersigned hereby certify that the compasses of the steamer (*name of steamer*) are in all respects to our satisfaction. We know the errors and can apply them.”

Dated at

this day of 18 .

Master.

Mate.

“We hereby attest the above signatures and certify that the said (*master's name*) sailed as master, and that the said (*mate's name*) sailed as mate of the said vessel on her last voyage, ending 18 .

Owners.

This certificate, which must be attested by the owners, must be signed by the master and mate, one of whom at least must have made the previous, and is going to make the next voyage in the vessel.

Deck pump
to be fitted.

43. There must be for each compartment a pump of sufficient size, which can be worked from the upper deck. A rose or perforated box of sufficient size should be fitted at the end of the suction pipe of each pump, and means provided for clearing the end of the suction pipe. A trunk-way leading from the upper deck to the suction of each pump, large enough for a man to go down to the end of the suction pipe, is the best arrangement for this purpose.

It is very desirable that the steam winches (if any) be so fitted and arranged that the deck pumps can be worked by them as well as by hand.

Deck pumps, when not worked by machinery, should have handles at least long enough for two men to work at them.

Sounding
pipes, &c.

44. There must be fitted at the bottom of each bulkhead means for ascertaining the depth of water in each compartment.

Engine-room
pumps.

45. Pipes connected with pumps worked by the engines are to be carried through the bulkheads into the compartments fore and aft of the engine-room, so that each compartment can be pumped out separately by the engines as well as by the deck pump. The pipes should be well secured where they pass through the bulkheads, and it is very desirable that cocks or valves be fitted between these suction pipes and the bulkheads, to be capable of being opened or shut from the upper or main deck.

Pumps not
necessary in
fore peak, &c.

46. In all sea-going screw vessels there must be a strong water-tight deck over the cast-iron tube aft, so as to make a tank round the tube, and a properly fitted man-hole at the top or fore end. Collision bulkheads must also be fitted in sea-going vessels: if they are not fitted, the Surveyor should decline to grant a declaration. These compartments are generally small, and the Surveyor should not insist on a separate deck pump leading direct into them.

47. A spare tiller, properly fitted to the rudder ^{Steering gear.} head, relieving tackle, &c., should, in all sea-going and home-trade steamers, be kept near the after-steering gear ready for immediate service. Rudder pendants should also be securely fastened to the back of the rudder, with their ends led up to a place accessible in all weathers. In any case where the Surveyor is not satisfied that the rudder pendants are made fast so as to have sufficient power over the rudder, he should see that an efficient bumpkin is securely fitted, to which the rudder pendants must be made fast. The steering gear should be thoroughly overhauled at every survey, and taken to pieces and thoroughly examined at least once a year. The chains and blocks that are liable to interfere with or endanger the passengers or crew should be guarded by portable but properly secured guards.

It is very desirable that the man at the helm should be so placed that he has a clear look-out ahead, more especially in steamers that frequent crowded harbours or rivers.

48. In passing a helm indicator, the Surveyor should ^{Helm indicators.} ascertain by actual trial that whenever the pointer moves to the word "port" on the dial or plate, wherever that word may be, it shows that the helm is ported, and whenever the pointer points to the word "starboard," wherever that word may be, it means that the helm is starboarded.

49. In the foregoing directions, it is assumed that ^{Meaning of port helm.} "port helm" means that the helm is so moved as to turn the ship's head to the right, and "starboard helm" means that the helm is so moved as to turn the ship's head to the left.

50. A deep-sea lead-line of at least 120 fathoms, ^{Lead-lines.} a lead of at least 28 lb weight, and a suitable reel, together with at least two hand lead-lines of at least 25 fathoms, and leads of at least 7 lb should be supplied to all foreign-going steamers. In short-voyage steamers two hand lead-lines of 25 fathoms each and leads of at least 7 lb must be demanded. These are the minimum requirements. For a 1st class (*i.e.*, twelve months) declaration double the number of lines and eads must be provided. The Surveyor should see that the lead-lines are properly marked. The following marks are those usually adopted:—

At	2 fathoms	a piece of leather split in two strips.
"	3	" " " three strips.
"	5	" " white bunting.
"	7	" " red bunting.
"	10	" " leather with a hole.
"	13	" " blue bunting.
"	15	" " white bunting.
"	17	" " red bunting.
"	20	" a strand with two knots tied in it.

It is always best to have the lines fitted with calico for white marks, bunting for red marks, and serge for blue marks, because a man can tell the difference by the feel in the dark.

51. Surveyors must be very careful to see that each ^{Anchors chains cables hawsers, warps, &c.} steam ship they survey is provided with chain cables and anchors duly certified under the Chain Cable Acts. (34 & 35 Victoria Chapter 101). When the stream and kedge anchors exceed 168 lb in weight they also must be tested in accordance with the same Acts. The Surveyors should upon each survey require the production of the test certificates of all the chain cables and anchors. When from any cause these cannot be produced, the Surveyors should require satisfactory proof that the provisions of the Acts have been complied with.

The Surveyors must also see that the chain cable and anchors on board are sufficient for the service and

in good condition. The chain cables must be removed from the chain lockers at least once in twelve months, cleaned, if necessary, and the pins knocked out of the shackles. The shackle pins should be secured by small pins of hard wood.

The spare anchors should not be stowed below, but kept where they will be ready in case they are required.

Proper hawsers and warps must also be supplied.

Statutory distress signals.

52. The signals specified in the first schedule of the English Merchant Shipping Act of 1873 shall be deemed to be signals of distress.

In the daytime.—The following signals numbered 1, 2, and 3, when used or displayed together or separately, shall be deemed to be signals of distress in the daytime:—(1) a gun fired at intervals of about a minute; (2) the international code signal of distress indicated by N C; (3) the distant signal, consisting of a square flag having either above or below it a ball, or anything resembling a ball.

At night.—The following signals numbered 1, 2, 3, when used or displayed together or separately, shall be deemed to be signals of distress:—(1) a gun fired at intervals of about a minute; (2) flames on the ship (as from a burning tar barrel, oil barrel, &c.); (3) rockets or shells, of any colour or description, fired one at a time at short intervals.

To be examined.

53. The means for making signals of distress are to be carefully examined by the Surveyors, to see that they are kept dry and in good order, and are protected from fire and accident; and that the canon or mortar, which is to be of at least the size below specified, is in good condition and ready for use. The means for making flames should be lights that burn in water, or some other approved arrangement.

Description of signals to be provided, size of gun, &c.

54. The signals required are 12 blue lights, two of Holmes' storm or danger signal lights, and six of the smaller lights of the same description with means for attaching them to life-buoys; 12 rockets, each containing 16 ozs. of composition; one gun at least $3\frac{1}{2}$ inches in the bore, or one mortar at least $5\frac{1}{2}$ inches in the bore, with 12 charges of ammunition. The Socket Distress Signals of the Cotton Powder Company may be passed as sufficient for signals of distress, and they may be passed in lieu of guns or in lieu of rockets, but not as equivalent to both in sea-going steam ships and emigrant ships. When a gun is carried, each charge must contain 16 ozs. of pebble or bean powder in a flannel bag. An air-tight copper magazine, rammers, sponges, wads, priming wires, friction tubes, powder flask with fine powder for priming, and means for firing and withdrawing charges should be provided and carefully examined. The Holmes' Patent Storm and Danger Signal Lights must be supplied to each sea-going steam ship.

Rocket lockers.

55. The locker for keeping the rockets, blue lights, &c., should not be air-tight, but should have sufficient small safe openings to allow of the escape of any moisture generated; by this means the rockets, blue lights, &c., can be kept for a long period. Red pyrotechnic lights are dangerous.

Distress signals.

56. Surveyors should in every case in which the regulation distress signals are not on board the passenger (emigrant) ships, and sea-going passenger steamers, which they may be called on to survey, decline to grant papers or declarations, unless a written guarantee is given to them that the signals shall be on board, and an opportunity given for inspecting them before the ship sails.

Fire hose

57. Passenger steamers going to sea are to be provided with a hose adapted for the purpose of extinguishing fire in any part of the ship, and capable of being connected with the engines of the ship or with

the donkey engine if it can be worked from the main boiler. The Surveyor must take care that it answers the required purpose.

The fire-hoses should be connected, stretched to judge of their length, and thoroughly examined at every survey, and at least once a year (and at any other time that the Surveyor thinks it necessary) tested with the conductor in its place, by pumping water through them by the main or donkey engines at full speed. A proper conductor and metal bend or goose neck forms part of its equipment and must be provided. Generally leather hoses are the most durable, and should be supplied when a declaration for twelve months is required.

58. All decks and floors upon which passengers are carried, which are the main and lower decks only in sea-going steamers, must be caulked and properly secured. Sufficient light and ventilation must be provided. Scuttles and hatches are not considered as efficient means of ventilation. Proper and sufficient means of ingress and egress must be fitted. Companions or booby hatches must in all cases be fitted to the entrances to passenger spaces, and be so arranged as to open and shut easily. Surveyors should satisfy themselves that there are hatches to batten down in bad weather, or that otherwise the booby hatch is itself so strong, and so securely bolted as to be part and parcel of the ship, and so fitted that it can be securely closed.

Deck to be caulked and have proper hatches, &c.

59. All sea-going passenger steamers must have planked bulwarks of such a height as is, in the Surveyor's judgment, necessary for the proper shelter and protection of the passengers, or rails, stanchions and a weather cloth, to give the required protection.

Height, &c., of bulwarks.

BOILERS AND SUPERHEATERS.

60. In the case of boilers built in the United Kingdom for steam ships applying for survey certificates under Act VII of 1884, the Surveyor is authorized to accept test certificates for such boilers duly signed by officers of the Board of Trade. If such a certificate cannot be produced, the addition (Y) in Rule 70 will be made to the factor of safety in computing the strength of the boiler.

Board of Trade test certificates to be accepted.

61. The Surveyor is required to fix the limits of weight to be placed on the safety-valves of sea-going steam ships. The Surveyor having himself fixed the limits of the weight, is then required to declare that in his judgment the boiler and machinery are sufficient for the service intended, and in good condition, and that they will be sufficient for twelve months, or such other period as he may, in his judgment, determine. For his guidance the following directions are given.

The Surveyor to fix pressure on safety valves.

62. The Surveyor should fix the working pressure for boilers by a series of calculations of the strength of the various parts and according to the workmanship and material. The Surveyors should therefore receive and report on any plans of boilers intended for sea-going vessels that may be submitted in due course with the form of application and fees. They are not to report on any tracing or plan that is not accompanied by that form, or when they have reason to believe that the boilers, when finished, are not intended to be placed on board steamers that will require survey certificates. When the Surveyor has received plans and tracings of new boilers, or of alterations of boilers, and has approved of them, he will of course, be careful in making his examinations from time to time, to see that they are followed in construction. When he has not had the plans submitted, but is called in to survey a boiler, he will, of

Working pressure to be fixed by calculation.

course measure the parts, note the details of construction, and, if necessary, bore the plates to ascertain their thickness, &c., before he gives his declaration.

The Surveyor cannot declare a boiler to be safe unless he is fully informed as to its construction, material, and workmanship. He should therefore be very careful how he ventures to give a declaration for a boiler that he is not called in to survey until after it is completed and fixed in the ship.

Respecting
stays.

63. In the case of new boilers the Surveyors may allow a stress not exceeding 7,000lb per square inch of net section on solid iron screwed stays and supporting flat surfaces, but the stress should not exceed 5,000lb when the stays have been welded or worked in the fire.

The areas of diagonal stays are found in the following way:—Find the area of a direct stay needed to support the surface; multiply this area by the length of the diagonal stay, and divide the product by the length of a line drawn at right angles to the surface supported to the end of the diagonal stay; the quotient will be the area of the diagonal stay required.

When gusset stays are used their area should be in excess of that found in the above way.

Girders for
flat surfaces.

64. When the tops of combustion boxes or other parts of a boiler are supported by solid rectangular girders the following formula should be used for finding the working pressure to be allowed on the girders, assuming that they are not subjected to a greater temperature than the ordinary heat of steam; and in the case of combustion chambers, that the ends are fitted to the edges of the tube plate and the back plate of the combustion box:—

$$\frac{C \times d^2 \times T}{(W-P) D \times L} = \text{Working pressure.}$$

W = Width of combustion box in inches.

P = Pitch of supporting bolts in inches.

D = Distance between the girders from centre to centre in inches.

L = Length of girder in feet.

d = Depth of girder in inches.

T = Thickness of girder in inches.

C = 500 when the girder is fitted with one supporting bolt.

C = 750 when the girder is fitted with two or three supporting bolts.

C = 850 when the girder is fitted with four supporting bolts.

The working pressure for the supporting bolts and for the plate between them should be determined by the rule for ordinary stays.

Flat surfaces
of boilers.

65. The pressure on plates forming flat surfaces is found by the following formula:—

$$\frac{C \times (T + 1)^2}{S - 6} = \text{Working pressure.}$$

T = Thickness of the plate in sixteenths of an inch.

S = Surface supported in square inches.

C = Constant according to the following circumstances.

C = 100 when the plates are not exposed to the impact of heat of flame, and the stays are fitted with nuts and washers, the latter being at least three times the diameter of the stay and two-thirds the thickness of the plates they cover.*

C = 90 when the plates are not exposed to the impact of heat or flame, and the stays are fitted with nuts only.

* If the diameter of riveted washers be at least $\frac{1}{3}$ rds the pitch of the stays, and the thickness not less than the plates they cover, the constant may be increased to 150.

When doubling plates are fitted of the same thickness as the plates they cover, and not less in width than $\frac{1}{3}$ rds of the pitch of the stays, the constant may be increased to 160.

When doubling plates cover the whole of the flat surface the case should be submitted for the consideration of the Board.

- C = 60 when the plates are exposed to the impact of heat or flame, and steam in contact with the plates, and the stays fitted with nuts and washers, the latter being at least three times the diameter of the stay and two-thirds the thickness of the plate they cover.
- C = 54 when the plates are exposed to the impact of heat or flame, and steam in contact with the plate, and the stays fitted with nuts only.
- C = 80 when the plates are exposed to the impact of heat or flame, with water in contact with the plates, and the stays screwed into the plate and fitted with nuts.
- C = 60 when the plates are exposed to the impact of heat or flame, with water in contact with the plate, and the stays screwed into the plate, having the ends riveted over to form a substantial head.
- C = 36 when the plates are exposed to the impact of heat or flame, and steam in contact with the plates, with the stays screwed into the plate, and having the ends riveted over to form a substantial head.

When the riveted ends of screwed stays are much worn, or when the nuts are burned, the constants should be reduced, but the Surveyor must act according to the circumstances that present themselves at the time of survey; and it is expected that in cases where the riveted ends of screwed stays in the combustion boxes and furnaces are found in this state it will be often necessary to reduce the constant 60 to about 36.

66. The Surveyors should not in any case allow a greater compressive stress on the tube plates than is obtained by the following formula:—

$$\frac{(D-d) \times 15000}{W \times D} = \text{Working pressure.}$$

D = least horizontal distance between centres of tubes in inches.

d = inside diameter of ordinary tubes in inches.

T = thickness of tube plate in inches.

W = extreme width of combustion box in inches from front of tube plate to back of fire box, or distance between combustion box tube plates when boiler is double ended and the box common to the furnaces at both ends.

67. The Surveyors should take care that wet-bottomed boilers, the outside of the bottom of which cannot be seen, are lifted for inspection at least once in every four years, or oftener, if the Surveyor considers it necessary. It will often be found necessary long before this to reduce the pressure, unless the boilers are lifted from their seats, for the latter to judge of their efficiency. If the owners in any special case have any good reasons for not wishing to lift them when the Surveyor requires it, the Surveyor should submit the whole case in detail to the Government for consideration. The Surveyor must recollect that he is not to certify as sufficient any boiler respecting which he cannot thoroughly satisfy himself.

The Surveyor should record in the hydraulic test book the dates on which wet-bottomed boilers are inspected when lifted, and whether the boilers were out of the ship when examined, and if out of the ship where they were examined. Boilers which have been lifted should in all cases be subjected to the hydraulic test before they are re-set.

68. When cylindrical boilers are made of the best material with all the rivet holes drilled in place and all the seams fitted with double butt straps each of at least $\frac{1}{2}$ the thickness of the plates they cover, and all the seams at least double riveted with rivets having an allowance of not more than 75 per cent. over the

Compressive stress on tube plates.

Wet-bottomed boilers.

Cylindrical boilers.

single shear, and provided that the boilers have been open to inspection during the whole period of construction, then five may be used as a factor of safety. The tensile strength of the iron is to be taken as equal to 47,000lb per square inch with the grain, and 40,000lb across the grain. But when the above conditions are not complied with, the additions in the following scale must be added to the factor 5, according to the circumstances of each case :—

A†	·15	To be added when all the holes are fair and good in the longitudinal seams, but drilled out of place after bending.
B†	·3	To be added when all the holes are fair and good in the longitudinal seams, but drilled out of place before bending.
C	·3	To be added when all the holes are fair and good in the longitudinal seams, but punched after bending instead of drilled.
D	·5	To be added when all the holes are fair and good in the longitudinal seams, but punched before bending.
E*	·75	To be added when all the holes are not fair and good in the longitudinal seams.
F	·1	To be added if the holes are all fair and good in the circumferential seams, but drilled out of place after bending.
G†	·15	To be added if the holes are fair and good in the circumferential seams, but drilled before bending.
H	·15	To be added if the holes are fair and good in the circumferential seams, but punched after bending.
I†	·2	To be added if the holes are fair and good in the circumferential seams, but punched before bending.
J*	·2	To be added if the holes are not fair and good in the circumferential seams.
K	·2	To be added if double butt straps are not fitted to the longitudinal seams, and the said seams are lap and double riveted.
L	·1	To be added if double butt straps are not fitted to the longitudinal seam, and the said seams are lap and treble riveted.
M	·3	To be added if only single butt straps are fitted to the longitudinal seams, and the said seams are double riveted.
N	·15	To be added if only single butt straps are fitted to the longitudinal seams, and the said seams are treble riveted.
O	1	To be added when any description of joint in the longitudinal seams is single riveted.
P	·1	To be added if the circumferential seams are fitted with single butt straps and are double riveted.
Q	·2	To be added if the circumferential seams are fitted with single butt straps and are single riveted.
R	·1	To be added if the circumferential seams are fitted with double butt straps and are single riveted.
S††	·1	To be added if the circumferential seams are lap joints and are double riveted.

T	·2	To be added if the circumferential seams are lap joints and are single riveted.
U	·25	To be added when the circumferential seams are lap and the strakes of plates are not entirely under or over.
V†	·3	To be added when the boiler is of such a length as to fire from both ends, or is of unusual length, such as flue boilers; and the circumferential seams are fitted as described opposite P, R, and S, but of course when the circumferential seams are as described opposite Q and T, V ·3 will become V ·4.
W*	·4	To be added if the seams are not properly crossed.
X*	·4	To be added when the iron is in any way doubtful, and the Surveyor is not satisfied that it is of the best quality.
Y+++	1·65	To be added if the boiler is not open to inspection during the whole period of its construction.

Where marked * the allowance may be increased still further if the workmanship or material is very doubtful or very unsatisfactory.

† When the holes are to be rimmed or bored out in place the case should be referred for orders as to the reduction or omission of A, B, G, and I as heretofore.

‡ When boilers are comparatively short the cases should be submitted for consideration as to the omission of V.

†† When the circumferential seams are lapped and treble-riveted the case should be submitted for orders.

††† When surveying boilers that have not been open to his inspection during construction, the Surveyor may accept test certificate granted by a Board of Trade Surveyor in the United Kingdom.

The strength of the joints is found by the following method:—

$$\frac{(\text{Pitch} - \text{Diameter of rivets}) \times 100}{\text{Pitch}} = \left\{ \begin{array}{l} \text{Percentage of} \\ \text{strength of} \\ \text{plate at joint} \\ \text{as compared} \\ \text{with the solid} \\ \text{plate.} \end{array} \right.$$

$$\frac{(\text{Area of rivets} \times \text{No. of rows of rivets}) \times 100}{\text{Pitch} \times \text{thickness of plate.}} = \left\{ \begin{array}{l} \text{Percentage of strength of rivets as} \\ \text{compared with the solid plate.*} \end{array} \right.$$

Then take iron as equal to 47,000lb per square inch and use the smaller of the two percentages as the strength of the joint, and adopt the factor of safety as found from the preceding scale—

* If the rivets are exposed to double shear multiply the percentage found by 1·75.

$(47,000 \times \text{percentage of strength of joint}) \times \text{twice the thickness of the plate in inches.}$

Inside diameter of the boiler in inches $\times$ factor of safety
 $= \left\{ \begin{array}{l} \text{Pressure to be allowed per square inch on the} \\ \text{safety valves.} \end{array} \right.$

Butt straps.

In the case of zigzag riveting, the strength through the plate diagonally between the rivets is equal to that horizontally between the rivets, when diagonal pitch $= \frac{6}{10}$ horizontal pitch $+ \frac{4}{10}$ diameter of rivet.

Plates that are drilled in place must be taken apart and the burr taken off, and the holes slightly countersunk from the outsides.

69. Butt straps must be cut from plates and not from bars, and must be of as good a quality as the shell plates, and for the longitudinal seams must be cut across the fibre. The rivet holes may be punched or drilled when the plates are punched or drilled out of place, but when drilled in place, must be taken apart and the burr taken off and slightly countersunk from the outside.

When single butt straps are used and the rivet holes in them punched they must be one-eighth thicker than the plates they cover.

The diameter of the rivets must not be less than the thickness of the plates of which the shell is made; but it will be found when the plates are thin, or when lap joints or single butt straps are adopted, that the diameter of the rivets should be in excess of the thickness of the plates.

Dished ends must be stayed as flat surfaces; but when they are theoretically equal to the pressure needed, when considered as portions of spheres, the stays, when solid, may have a stress of 14,000lb. per square inch of net section, but the stress should not exceed 10,000lb. when the stays have been welded or worked in the fire.

Truly hemispherical ends subjected to internal pressure may be allowed double the pressure that is suitable for cylinder of the same diameter and thickness.

All man-holes and openings must be stiffened with compensating rings of at least the same effective sectional area as the plates cut out, and in no case should the plate rings be less in thickness than the plates to which they are attached. The openings in the shells of cylindrical boilers should have their shorter axes placed longitudinally. It is very desirable that the compensating rings round openings in flat surfaces be made of **L** or **T** iron. Cast iron doors are not to be passed.

Circular furnaces.

The neutral part of boiler shells under steam domes must be efficiently stiffened and stayed, as serious accidents have arisen from the want of such precautions. The boilers must be tested by hydraulic pressure to twice the working pressure in the presence and to the satisfaction of the Surveyors.

70. Circular furnaces with the longitudinal joints welded or made with a butt strap:—

$90,000 \times \text{the square of the thickness of the plate in inches.}$

$(\text{Length in feet} + 1) \times \text{diameter in inches.}$
 $= \text{working pressure per square inch, provided it does not exceed that found by the following formula:—}$

$\frac{8,000 \times \text{thickness in inches}}{\text{diameter in inches}} = \left\{ \begin{array}{l} \text{Working pressure} \\ \text{per square inch.} \end{array} \right.$

The second formula limits the crushing stress on the material to 4,000lb per square inch.

The length is to be measured between the rings if the furnace is made with rings.

If the longitudinal joints instead of being butted are lap jointed in the ordinary way, then 70,000 is to be used instead of 90,000, excepting only where the lap is bevelled and so made as to give the flues the form of a true circle, when 80,000 may be used.

When the material or the workmanship is not of the best quality, the constants given above must be reduced, that is to say, the 90,000 will become 80,000; the 80,000 will become 70,000; the 70,000 will become 60,000; and when neither the material nor the workmanship are of the best quality, such constants will require to be further reduced, according to circumstances and the judgment of the Surveyor, as in the case of old boilers. One of the conditions of best workmanship is that the joints are either double riveted with single butt straps, or single riveted with double butt straps, and the holes drilled after the bending is done and when in place, and afterwards taken apart, the burr on the holes taken off, and the holes slightly countersunk from the outside.*

The working pressure for corrugated furnaces, practically circular and machine-made, provided the plane parts at the ends do not exceed six inches in length, and the plates are not less than $\frac{1}{16}$ inch thick, should not be greater than found by the following formula:—

$$9,000 \times \text{thickness in inches} = \left\{ \begin{array}{l} \text{Working pressure per} \\ \text{mean diameter in inches.} \end{array} \right. \text{square inch.}$$

When the furnaces are riveted in two or more lengths the case should be submitted for consideration, as it may be necessary to make a deduction.

71. The strength of the joints of cylindrical superheaters and the factor of safety are found in a similar manner as for cylindrical boilers and steam receivers, but instead of using 47,000 lb as the tensile strength of iron 30,000 lb is adopted, unless where the heat or flame impinges at, or nearly at, right angles to the plate; then 22,400 lb is substituted.

When a superheater is constructed with a tube subject to external pressure the working pressure should be ascertained by the rules given for circular furnaces, but the constants should be reduced as 30 to 47.

In all cases the internal steam pipes should be so fitted that the steam in flowing to them will pass over all the plates exposed to the impact of heat or flame.

Superheaters should, as regards survey, be deemed to be the *most important parts* of the boilers, and must be inspected *inside and outside*; those that cannot be entered on account of their size or arrangement must have a sufficient number of doors through which a thorough inspection of the whole of the interior can be made.

Special attention should be paid to the survey of superheaters, as with high pressure the plates may become dangerously weak, and not give any sound to

* The following examples will serve to show the application of the constants for the different cases that may arise:—

Furnaces with butt joints and drilled rivet holes.	90,000 when the longitudinal seams are welded.
	90,000 where the longitudinal seams are double riveted and fitted with single butt straps.
	80,000 where the longitudinal seams are single riveted and fitted with single butt straps.
	80,000 where the longitudinal seams are single riveted and fitted with double butt straps.
Furnaces with butt joints and punched rivet holes.	85,000 where the longitudinal seams are double riveted and fitted with single butt straps.
	75,000 where the longitudinal seams are single riveted and fitted with single butt straps.
	85,000 where the longitudinal seams are single riveted and fitted with double butt straps.
	80,000 where the longitudinal seams are double riveted and bevelled.
Furnaces with lapped joints and drilled rivet holes.	75,000 where the longitudinal seams are double riveted and not bevelled.
	70,000 where the longitudinal seams are single riveted and bevelled.
	85,000 where the longitudinal seams are single riveted and not bevelled.
	75,000 where the longitudinal seams are double riveted and bevelled.
Furnaces with lapped joints and punched rivet holes.	70,000 where the longitudinal seams are double riveted and not bevelled.
	65,000 where the longitudinal seams are single riveted and bevelled.
	80,000 where the longitudinal seams are single riveted and not bevelled.
	75,000 where the longitudinal seams are double riveted and bevelled.

In the case of upright fire boxes of donkey or similar boilers, 10 per cent. should be deducted from the constant given above, applicable to ².

indicate their state when tested with a hammer; the plates should therefore be occasionally drilled.

Before commencing the survey, it is prudent to question the engineer officers as to the tendency of boilers to flame; if flaming is a frequent occurrence, extra care must be taken in the survey, and in fixing the pressure to be allowed as the tensile strength of the plate, when heated, is often reduced to about four tons per square inch. Drain pipes must in all cases be fitted to superheaters in which a collection of water in the bottom is possible.

Safety valve
for super-
heaters.

72. Superheaters that can be shut off from the main boilers must be fitted with parliamentary safety valve of sufficient size, but the least size passed should be 3 inches diameter.

The flat ends of all boilers, as far as the steam space extends, and the ends of superheaters, should be fitted with shield, or baffle-plates, where exposed to the hot gases in the uptake; as all plates subjected to the direct impact of heat or flame are liable to get injured unless covered with water.

STEEL BOILERS.

73. The following should guide the Surveyors when the general quality of the steel has been found suitable for marine boilers.

Maker's test.

74. The steel-makers or boiler-makers should test one or more strips cut from each plate for tensile strength and elongation, and stamp both results on a part of the plate, where they can be easily seen when the boiler is constructed.

Surveyor's
tests.

75. The Surveyor is not obliged to witness the foregoing tests, although it is very desirable that he should, when his other duties will allow him to do so, but he should, however, select at least one in four of these plates, either at the steel works or the boiler-maker's works, and witness the testing of at least one strip cut from each selected plate.

Rivet tests.

76. A few rivets of each size should be selected, and should be turned and tested for tensile stress. The tensile stress should be from 28 tons to 32 tons per square inch, with a contraction of area of about 60 per cent.

Tensile and
bending tests.

77. If for the plates from which the Surveyor selects the above proportions a greater stress is wished than is allowed for iron, tests for tensile stress and elongation should be made, and those for which no reduction of thickness is asked may be tested for resistance to bending if preferred.

Test strips.

78. The breadth of test strips for tensile stress should be about two inches, and the elongation, taken in a length of ten inches, should be about 25 per cent., and not less than 20 per cent. The test strips must be carefully prepared and measured, and they should be cut from the plate by a planing or shaping machine.

Bending tests.

79. The bending tests for plates *not* exposed to flame should be made with strips in their normal condition, but strips cut from furnaces, combustion boxes, &c., should be heated to a cherry red, then plunged into water of about 80°, and kept there until of the same temperature as the water, and then bent. The bending strips should not be less than two inches broad and 10 inches long, and they should be bent until they break, or until the sides are parallel at the distance from each other of not less than (3) three times the thickness of plate.

Tensile stress,
&c.

80. The tensile stress of the plates *not* exposed to flame should be about 28 tons, and should not exceed 32 tons per square inch of section, and 28 tons should be the stress used in the calculations for cylindrical shells if the plate comply with all the conditions as stated herein; but when the minimum tensile stress of shell plates exceeds 28 tons, and allowance is wished for

the excess, the case should be specially submitted for the consideration of Government. The tensile stress of furnace flanging and combustion-box plates should range from 26 tons to 30 tons per square inch.

81. All plates that are punched, flanged, or locally heated must be carefully annealed after being so treated. Annealing.

82. The rivet holes in the furnaces and longitudinal seams of cylindrical shells should be drilled, but if it is wished to punch them and afterwards bore or anneal the plates in a proper furnace, the proposed method of the punching and boring or annealing should be submitted for consideration before being done; but all punched holes should be made after bending. Punching and annealing.

In all cases where assent has been given to for plates to be punched after bending and then annealed, the makers should stamp the plates with the words "punched after bending and then annealed," and in all cases where assent has been given for punching and afterwards boring plates, the words "punched and then bored" should be stamped on the plates.

83. Bars for stays should be tested. Solid steel screwed stays which have not been welded or otherwise worked after heating may be allowed a working stress of 9,000 lb per square inch of net section, provided the tensile stress is from 28 to 30 tons per square inch and the elongation in 10 inches about 25 per cent. and not less than 20 per cent. Steel stays which have been welded or worked in the fire have been found to be unreliable, therefore they should not be passed. Stress on stays.

84. If the flanging plates and those exposed to flame comply with the foregoing conditions, the constant in the Board of Trade rules for iron boilers may be increased as follows:— Constants for flat surfaces.

The constants for flat surfaces when they are supported by stays screwed into the plate and riveted 10 per cent.

The constants for flat surfaces when they are supported by stays screwed into the plate and nutted, or when the stays are nutted in the steam space, 25 per cent. This is also applicable to the constants for flat surfaces stiffened by riveted washers or doubling strips and supported by nutted stays.

The constants for combustion-box girders 10 per cent.

85. The furnace constants about 10 per cent. when plane. When new corrugated and machine-made, and practically true circles, the working pressure is found by the following formula, provided that the plane parts at the ends do not exceed 6 inches in length, and the plates are not less than $\frac{5}{16}$ inch thick. Furnaces, plane and corrugated.

$$\frac{12,500 \times T}{D} = \text{working pressure.}$$

T = thickness in inches.

D = mean diameter in inches.

(If the furnace is riveted in two or more lengths, the case should be submitted for consideration.)

86. A greater compressive stress should not be allowed on tube plates than that found by the following formula:— Compressive stress on tube plates.

$$\frac{(D-d) T \times 20,000}{W \times D} = \text{working pressure.}$$

D = least horizontal distances between centres of tubes in inches.

d = inside diameter of tubes in inches.

T = thickness of tube plate in inches.

W = extreme width of combustion-box in inches from front of tube-plate to back of fire-box, or distance between combustion-box tube-plates when boiler is double-ended and the box common to the furnaces at both ends.

Plate and rivet
section.

87. The rivet section, if of iron, in the longitudinal seams of cylindrical shells, where lapped and at least double riveted, should not be less than $\frac{1}{3}$ times the net plate section, but if steel rivets are used, their section should be at least $\frac{2}{3}$ of the net section, if the plate of the tensile stress of the rivets is not less than 28 tons and not more than 32 tons per square inch. Therefore in calculating the working pressure the percentage strength of the rivets may be found in the usual way by the foregoing rules, but in the case of iron rivets, the percentage found should be divided by $\frac{1}{3}$, and in the case of steel rivets by $\frac{2}{3}$, the result being the percentages required. If the percentage strength of the rivets by calculation is less than the calculated percentage strength of the plate, calculate the working pressure by both percentages. When using the percentage strength of the plate, use the nominal factor of safety suitable for the method of construction, as by the rules for iron boilers; but when using the percentage strength of rivets, use 5 as the factor of safety. The less of the two pressures so found is the working pressure to be allowed for the cylindrical portion of the shell.

Local heating
to be avoided.

88. Local heating of the plates should be avoided, as many plates have failed from having been so treated.

Welding, &c.

Steel plates which have been welded should not be passed if subjected to a tensile stress, and those welded and subject to a compressive stress should be efficiently annealed.

In other respect the boilers should comply with the rules for iron boilers.

If the tests are to be made at the steel works, the boiler-makers should inform the Surveyors in their district when and where they will be made, so that the Surveyor from the nearest district to the steel works may be instructed to attend to them. The Surveyor should have due notice two or three days when the plates, &c., will be ready for the test pieces to be cut from them. (Surveyors should report all cases of failures of steel plates, &c., which may come to their knowledge.)

Steel for super-
heaters, &c.

89. If steel is proposed to be used in superheaters, the particulars should be submitted to the Government for consideration; but in all cases it should be discouraged for this purpose.

This applies to the unshielded uptakes of all boilers, including ordinary vertical donkey boilers.

Makers of steel.

90. When the steel is not to be made by any of the following makers, the case will receive the special consideration of the Government, and this should be specially noted by the Surveyors:—

Messrs. Beardmore.

„ J. Brown & Co.

„ C. Cammell & Co.

Mr. D. Colville.

The Landore Steel Company.

The Leeds Forge Company.

The Steel Company of Scotland.

The Weardale Iron and Coal Company.

The West Cumberland Iron and Steel Company.

Boiler tracings,
&c.

91. Difficulty has been experienced with regard to the survey of steel boilers, owing to the fact that some makers were not aware, at the time the boilers were commenced, that a Survey certificate would be necessary, and the makers have therefore omitted to submit tracings until the boilers have been nearly completed. Tracings of boilers may therefore be received for examination upon payment of the usual fee of Rs. 50, and the Surveyors may proceed as far as witnessing the hydraulic test before

any further instalment of the survey fee is paid. Engineers and boiler makers should be advised of this arrangement.

BOILERS GENERAL.

92. Donkey boilers that are in any way attached to, or connected with, the main boilers, or with the machinery used for propelling the vessel, must be surveyed and be fitted the same way as the main boilers, and have a water and steam gauge, and all other fittings complete, and, as regards safety valves, must comply with the same regulations as the main boilers. Donkey boilers.

93. No boiler or steam chamber is to be so constructed, fitted, or arranged so that the escape of steam from it through the safety valve required by the Act of Parliament can be wholly, or partially, intercepted by the action of any other valve. Stop valves.

A stop valve must always be fitted between the boiler and the steam pipe, and, where two or more boilers are connected with a steam receiver or superheater, between each boiler and the superheater or steam receiver. The object of this is obvious, viz. to avoid the failure of all the boilers through the failure of one. The necks of stop valves should be as short as practicable.

94. Each boiler must be fitted with a glass water-gauge, at least two test cocks, and steam-gauge; that is to say, each boiler must be fitted with all fittings as complete as if there were only one boiler. Boilers that fire both ends, and those of unusual width, must have water-gauges and test cocks at each end or side, as the case may be. When a steamer has more than one boiler, and these boilers are fitted with stop-valves, each boiler must be treated as a separate one, and have all the requisite fittings. Gauges, &c.

95. When the boilers are not large enough for the Surveyors to get into, they should see them tested by hydraulic pressure at every annual survey at least. The hydraulic test should also be applied at every intermediate survey if the Surveyor considers it necessary. In the case of old boilers the Surveyors must use their own judgment as to the necessary pressure to be applied. This is in no way to interfere with the instructions to test all new boilers to double their working pressure, nor with the proper internal examination of all boilers that are large enough for the Surveyors to get into. Boilers to be tested when too small to enter.

Whenever it is only stays that prevent getting in, he may order their removal, and he must see them properly replaced before granting his declaration.

96. If the boiler is too hot for the Surveyor to examine the inside efficiently, and with safety and convenience, he should decline to examine the boiler, and absolutely refuse to grant a declaration, until he can make an efficient internal examination. Surveyors not to go into hot boilers.

97. Before testing a boiler, the Surveyor should examine it, take the necessary measurements, and calculate what the working pressure should be in accordance with the regulations, and only test to double the working pressure; if the test is not satisfactory the defects must be made good, and the boiler re-tested. Strength of boilers to be ascertained, and working pressure fixed by calculation.

This instruction applies to superheaters and steam chests as well as to boilers.

The Surveyor who grants the declaration must examine the boilers thoroughly, and will be held responsible for the pressure allowed.

98. Surveyors should see all new boilers, and boilers that have been taken out of the ship for a thorough repair, tested by hydraulic pressure up to at least double the working pressure that will be allowed previous to Hydraulics.

the boilers being placed in the vessel, to test the workmanship, &c.; but the working pressure is to be determined by the strength of stays, thickness of plates, and strength of riveting, &c., and not by the hydraulic test.

The hydraulic test should in no case exceed twice the calculated working pressure of the boiler, and it is never to be applied until the boiler has been examined in accordance with paragraph and until the strength has been calculated from the necessary measurements taken from the boiler itself.

When the boilers are in the vessel the Surveyor may, at any time he thinks it necessary, before he gives a declaration, have them tested by hydraulic pressure to satisfy himself as to any doubtful part, or of places not easy of access, care being taken in the case of old boilers not to overstrain them; but the test must always exceed the working pressure.

Surveyors should pay particular attention to the examination and testing of steam pipes.

The hydraulic test should be applied to the boilers of all steamers that have not previously had a survey certificate, before a declaration is granted for them. The amount of the hydraulic pressure test and the date on which it was last applied to the boilers should be inserted in the Surveyor's declaration and recorded in the office boiler book.

Cast iron in
boilers and
steam-pipes.

99. In all boilers in which the Surveyors find that cast iron is employed in such a manner as to be subject to the pressure of steam or water, great care must be taken. Cast iron must not be used for stays, and Surveyors should also discourage the use of cast iron for chocks and saddles for boilers. Particular attention should be paid to the chocking of boilers, more especially when they are fired athwartships.

Pressure fixed
by one Sur-
veyor not to
be increased
by another.

100. A pressure once allowed on the boiler of a sea-going steam ship is not to be increased unless, in cases where a Surveyor is of opinion that an increased pressure may with safety be allowed, he has communicated with the Surveyor who last surveyed the vessel; and on learning the reasons why the existing pressure was formerly allowed, the Surveyor is of opinion that it may be increased.

SAFETY VALVES.

Provisions of
the Act as
regards safety-
valves.

101. Every steam ship shall be provided with a safety valve upon each boiler, so constructed as to be out of the control of the engineer when the steam is up, and if such valve is in addition to the ordinary valve, it shall be so constructed as to have an area not less, and a pressure not greater, than the area of and pressure on that valve.

The Surveyors are instructed that in all *new boilers*, and whenever *alterations can be easily made*, the valve chest should be placed directly on the boiler; and the neck, or part between the chest and the flange which is bolted on to the boiler, should be as short as possible and be cast in one with the chest.

The Surveyors should note that it is not intended by this instruction that vessels with old boilers which have been previously passed with such an arrangement should be detained for the alterations to be carried out.

Of course in any case in which a Surveyor is of opinion that it is positively dangerous to have a length of pipe between the boilers and the safety valve chest, it is his duty at once to insist on the requisite alterations being made before granting a declaration.

If any person places an undue weight on the safety valve of any steam ship, or increases such weight beyond the limits fixed by the Engineer-Surveyor, he shall, in addition to any other liabilities he may incur by so doing, incur a penalty not exceeding one thousand rupees.

The Engineer-Surveyor shall declare, amongst other things, the limits of the weight to be placed on the safety valves; that the safety valves are such, and in such condition as required by these rules, and that the machinery is sufficient for the service for the time he fixes, and is in good condition for that time.

102. The area of Government safety valves, or (when there is more than one) the combined area of the Government safety valves should be not less per square foot of fire-grate surface than that given in the following table opposite the boiler pressure intended, provided the valves are not less than three inches in diameter. This applies to new vessels or vessels which have not received survey certificate.

When, however, the valves are of the common description, and are made in accordance with the tables, it will be necessary to fit them with springs having great elasticity, or to provide other means to keep the accumulation within moderate limits.

If there is only one safety valve on a main boiler, the Surveyor should not grant a declaration without first referring the case for special instructions.

In the case of small boilers, such as launch boilers, if it is wished to fit valves smaller than three inches diameter, the case should be submitted for orders.

Safety valve areas.

Boiler pressure.	Area of valve per square foot of fire-grate.	Boiler pressure.	Area of valve per square foot of fire-grate.	Boiler pressure.	Area of valve per square foot of fire-grate.
lb.	Sq. Inch.	lb.	Sq. Inch.	lb.	Sq. Inch.
15	1.250	77	.407	139	.243
16	1.209	78	.403	140	.241
17	1.171	79	.398	141	.240
18	1.136	80	.394	142	.238
19	1.102	81	.390	143	.237
20	1.071	82	.386	144	.235
21	1.041	83	.382	145	.234
22	1.013	84	.378	146	.232
23	.986	85	.375	147	.231
24	.961	86	.371	148	.230
25	.937	87	.367	149	.228
26	.914	88	.364	150	.227
27	.892	89	.360	151	.225
28	.872	90	.357	152	.224
29	.852	91	.353	153	.223
30	.833	92	.350	154	.221
31	.815	93	.347	155	.220
32	.797	94	.344	156	.219
33	.781	95	.340	157	.218
34	.765	96	.337	158	.216
35	.750	97	.334	159	.215
36	.735	98	.331	160	.214
37	.721	99	.328	161	.213
38	.707	100	.326	162	.211
39	.694	101	.323	163	.210
40	.681	102	.320	164	.209
41	.666	103	.317	165	.208
42	.657	104	.315	166	.207
43	.646	105	.312	167	.206
44	.635	106	.309	168	.204
45	.625	107	.307	169	.203
46	.614	108	.304	170	.202
47	.604	109	.302	171	.201
48	.595	110	.300	172	.200
49	.585	111	.297	173	.199
50	.576	112	.295	174	.198
51	.568	113	.292	175	.197
52	.559	114	.290	176	.196
53	.551	115	.288	177	.195
54	.543	116	.286	178	.194
55	.535	117	.284	179	.193
56	.528	118	.281	180	.192
57	.520	119	.279	181	.191
58	.513	120	.277	182	.190
59	.506	121	.275	183	.189
60	.500	122	.273	184	.188
61	.493	123	.271	185	.187
62	.487	124	.269	186	.186
63	.480	125	.267	187	.185
64	.474	126	.265	188	.184
65	.468	127	.264	189	.183
66	.462	128	.262	190	.182
67	.457	129	.260	191	.181
68	.451	130	.258	192	.181
69	.446	131	.256	193	.180
70	.441	132	.255	194	.179
71	.436	133	.253	195	.178
72	.431	134	.251	196	.177
73	.426	135	.250	197	.176
74	.421	136	.248	198	.176
75	.416	137	.246	199	.175
76	.412	138	.245	200	.174

Examination of
safety-valves.

103. The Surveyor, in his examination of the machinery and boilers, is particularly to direct his attention to the safety-valves, and whenever he considers it necessary, he is to satisfy himself as to the pressure on the boiler by actual trial.

The Surveyor is to fix the limits of the weights to be placed on the safety-valves, and the responsibility of not issuing a declaration before he is fully satisfied on the point is very grave. The law places on the Surveyors the responsibility of "declaring" that the boilers are in his judgment sufficient with the weights he states.

The Surveyor is to examine the whole of the valves, weights, and springs at every survey.

Surveyor to
see valves
weighted.

104. When the Surveyor has determined the amount of pressure, he is to see the valves weighted accordingly, and the weights or springs fixed in such a manner as to preclude the possibility of their shifting or in any way increasing the pressure. The limits of the weight on the valves is to be inserted in the declaration, and should it at any time come to a Surveyor's knowledge that the weights or the loading of the valve have been shifted, or otherwise altered, or that the valve has been in any way interfered with, so as to increase the pressure, he is at once to report the facts to Government.

Spring safety-
valves.

105. If the following conditions are complied with, the Surveyor need raise no question as to the substitution of spring loaded valves for dead weighted valves:—

- (1) That at least two separate valves are fitted to each boiler, except in the case of donkey or other small boilers, in which the grate surface does not exceed 14 square feet, in which case a single safety-valve may be passed, provided it is not less than three inches in diameter.
- (2) That the valves are of the proper size.
- (3) That the spring and valve be so cased in that it cannot be tampered with.
- (4) That provision be made to prevent the valve flying off in case of the spring breaking.
- (5) That the requisite safety-valve area is cased in the usual manner of Government valves.
- (6) That screw lifting gear be provided to ease all the valves.
- (7) That the size of the steel of which the spring is made is to be found by the following formula:—

$$\sqrt[3]{\frac{s \times D}{c}} = d$$

s = the load on the spring in lb.

D = the diameter of the spring (from centre to centre of wire) in inches.

d = the diameter, or side of square, of the wire in inches.

c = 8,000 for round steel.

c = 11,000 for square steel.

- (8) That the springs be protected from the steam and impurities issuing from the valves.
- (9) That when valves are loaded by direct springs, that the compressing screw abuts against a metal stop or washer, when the load sanctioned by the Surveyor is on the valve.

In no case is the Surveyor to give a declaration for a spring-loaded valve, unless he has examined it and is acquainted with the details of its construction, and unless he has tried it under full steam, and full firing, for at least 20 minutes with the feed-water and stop valve shut off. If the accumulation of pressure exceeds 10 per cent. of the loaded pressure, he should not give his declaration.

106. It is clearly the duty of the masters and engineers of vessels to see, in the intervals between the surveys, that the Government safety-valve or valves, as well as the other safety-valves and the rest of the machinery, are in proper working order. There is no provision in the Indian Steam-Ships' Act, exempting the owner of any vessel, on the ground that she has been surveyed, from any liability, civil or criminal, to which he would otherwise be subject. The Government safety-valve is to be out of the control of the engineer when the steam is up; this enactment, far from implying that he is not to have access to it, and to see to its working at proper intervals when the vessel is in port, rather implies the contrary; and the master should take care that the engineer has access to it for that purpose. A substantial lock, that cannot be easily tampered with, and as far as possible weather-proof, should be used for locking up the safety-valve boxes.

Owners, masters, and engineers to see that valves are kept in proper order.

107. In witnessing the hydraulic tests of boilers, &c., and in witnessing all safety-valve tests for accumulation of pressure, the Surveyors are to use the pressure gauges supplied to them for the purpose.

All tests for pressure and accumulation are to be made with proper gauges.

MACHINERY, &c.

108. The machinery to be surveyed comprises the engines and boilers used for propelling the vessel, and all the machinery connected therewith. The boilers of donkey engines are to be surveyed with the boilers and machinery of the vessel, when they are in any way connected with them.

What machinery is to be surveyed.

109. Surveyors should, before granting declarations for any period exceeding six months, be careful when examining the machinery; (1) to have the upper brasses of all bearings taken off; (2) the shaft turned round and carefully examined; (3) the cylinder covers and junk rings lifted for examination of the pistons and cylinders; (4) the slide covers or bonnets removed for examination of the slides, and if necessary, the slides taken out; (5) the air and circulating pump covers lifted for examination of the pump buckets and valves; (6) the covers of all feed and bilge pump valves removed for the examination of the valves; (7) all discharge valves and sea-cocks taken out for examination; (8) the propeller shaft to be drawn when necessary, and it and the screw to be examined, and in all cases in which the shaft is drawn, it is to be seen again after the screw is secured in its place; (9) the bridges and fire-bars to be removed to permit of a thorough examination of the boilers and furnaces; (10) all cocks and valves on the boilers to be taken out and examined.

When to be taken to pieces for examination.

When a Surveyor has seen the machinery of a new steamer in the shop before it was put together, and is satisfied with it, it will not be necessary to have it again opened up on board the ship on the first survey for examination, unless in the Surveyor's judgment it is necessary after the vessel has been tried under steam.

It will rest with owners to determine whether or not they will have a certificate for any period exceeding six months; but if they do so determine, then the above instructions are to be complied with before a declaration is granted.

The above instructions are also to apply at least once a year to the survey of all sea-going steamers, with the exception named in the next paragraph, whatever may be the period for which the declarations are given, and to carry out the whole of the above, it must be done when the vessel is in dry dock.

After the examination of the parts has been made as above, the machinery must be tried under steam at full pressure.

Examination
to be carefully
made.

110. In the examination of the machinery and boilers the Surveyor should in no case give a declaration without thoroughly satisfying himself that both the boilers and the machinery are sufficient for the service intended, and in good condition.

Separate feed
arrangements
to be fitted.

111. The boilers of all new sea-going vessels, passenger tugs, and other small passenger vessels, should be fitted with separate feeding arrangements in addition to, but unconnected with, the main feed pipes and valves. In very small vessels an efficient hand pump, instead of the donkey pump, may be passed if the Surveyor has satisfied himself as to its efficiency when steam is up, and provided there are separate feed pipes and valves as directed above. This instruction is to apply also in the case of old vessels of the above description, when being fitted with new boilers.

The Surveyors should discourage the practice of using the same pump for the bilges and for feeding boilers.

Cocks, valves
and pipes com-
municating
with ship's side.

112. All inlets or outlets in the bottom or side of a vessel near to, at, or below the deep-load water-line other than the outlets of watercloset, soil, scupper, lavatory, and urinal pipes, must have cocks or valves fitted between the pipes and the ship's side or bottom; such cocks or valves must be attached to the skin of the ship, and be so arranged that they can be easily and expeditiously opened or closed at any time; and the cocks, valves, and the whole length of the pipes should be accessible at all times.

Guards on
blow-off cocks.

113. With a view to the prevention of accidents to boilers through the blow-off cocks being left open after the boiler is run up, and to prevent water getting accidentally or intentionally into the ship by cocks being left open, and also to prevent the donkey engine becoming useless when used for feeding the boilers, all blow-off cocks and sea connexions are to be fitted with a guard over the plug, with a featherway in the same, and a key on the spanner, so that the spanner cannot be taken out unless the plug or cock is closed. One cock is to be fitted to the boiler, and another cock on the skin of the ship or on the side of the Kingston valve.

Non-return
valves to pipes.

114. In all cases where pipes are so led or placed that water can run from the boiler or the sea into the bilge, either by accidentally or intentionally leaving a cock or valve open, they should be fitted with a non-return valve and a screw not attached, but which will set the valve down in its seat when necessary; the only exception to this is the firemen's ash cock, which should have a cock or valve on the ship's side, and be above the stoke-hole plates.

Exhaust pipe
of donkey en-
gine not led
through ship's
side

115. The exhaust pipe for the donkey engine must not be led through the ship's side, but must be led on deck or into the main waste-steam pipe; and in all cases it should have a drain-cock on it. This will prevent water getting into the pipe when the ship is deeply laden or rolling.

Cocks or valves standing exceptional distances from the ship's plating, that is where the necks are longer than is necessary for making the joint, are to be discouraged, and if passed, they should be made of brass or gun-metal, and well bracketed.

Non-return
valves on
feed cocks.

116. Where the feed-cock or valve is so placed and arranged that more than one boiler can be fed at the same time through this cock or valve, a non-return valve must be fitted between each boiler and this cock or valve; but it is very desirable that all feed-cocks or valves should have a non-return valve fitted between the boiler and the cock or valve.

Cast-iron stand-pipes or cocks through which hot brine has to pass must never be passed.

117. In the case of the outlets of watercloset, soil, scupper, lavatory and urinal pipes which are below the weather deck, there should be an elbow of good substantial metal other than cast-iron or lead, and the pipe connected with this elbow should, if of lead, have a sufficient bend to provide for expansion in the pipe or any movement from the working of the ship. Pipes, no matter of what material they may be constructed, are never to be fitted in a direct line between the aperture in the ship's side and its connexion with the deck, or closet, or other fitting. Unless the watercloset and scupper pipes and their outlets are fitted in the way hereby required, or in a manner that will in the opinion of the Surveyor be more or equally efficient and safe, the Surveyor should refuse to grant a declaration. This paragraph applies only to sea-going vessels coming under survey for the first time.

Outlets of
watercloset
and scupper
pipes.

118. No question as to gear need be raised if the following spare gear and stores are supplied. The heavier portions of this gear must have been fitted and tried in its place, and must be kept on board where access can at all times be had to it:—

Spare gear
and stores to
be carried.

- 1 pair of connecting-rod brasses.
- 1 air-pump bucket, and rod, with guide.
- 1 circulating pump bucket and rod.
- 1 air-pump head valve, seat, and guard.
- 1 set of india-rubber valves for air pumps.
- 1 circulating pump head valve, seat and guard.
- 1 set of india-rubber valves for circulating pumps.
- 2 main bearing bolts and nuts.
- 2 connecting-rod bolts and nuts.
- 2 piston-rod bolts and nuts.
- 8 screw shaft coupling bolts and nuts.
- 1 set of piston springs.
- 3 sets, if of india-rubber, or 1 set if of metal, of feed-pump valves and seats.
- 3 sets, if of india-rubber, or 1 set if of metal, of bilge pump valves and seats.
- 1 hydrometer.
- Boiler tubes, 3 for each boiler.
- 100 iron assorted bolts, nuts, and washers, screwed, but need not be turned.
- 12 brass bolts and nuts, assorted, turned and fitted.
- 50 iron " " " "
- 50 condenser tubes.
- 100 sets of packing for condenser tube ends, or an equivalent.
- At least one spare spring of each size for escape valves.
- 1 set of water gauge glasses.
- 1/16th of the total number of fire-bars necessary.
- 3 plates of iron, assorted.
- 6 bars of iron, assorted.
- 1 complete set of stocks, dies, and taps, suitable for the engines.
- 1 smith's anvil.
- 1 fitter's vice.
- Ratchet-braces, and suitable drills.
- 1 copper or metal hammer.
- Suitable blocks and tacking for lifting weights.
- 1 dozen files, assorted, and handles for the same.
- 1 set of drifts, or expanders for boiler tubes.
- 1 set of safety valve springs (if so fitted) for every four valves; if there are not four valves, then at least one set of springs must be carried.
- 1 screw jack.

And a set of engineer's tools suitable for the service, including hammers and chisels for vice and forge; solder and soldering iron; sheets of tin and copper; spelter; muriatic acid, or other equivalent, &c., &c.

119. Main, and tunnel, and propeller shafts must not be passed without reference to Government if found

Size of shaft-
ing.

to be less in diameter than that found by the following rules:—

For compound engine, with two cylinders:—

$$\text{Diameter of shaft in inches} = \sqrt[3]{\frac{(d^2 \times P) + (D^2 \times 15)}{f}} C,$$

where d =diameter of high pressure cylinder in inches.

D =diameter of low pressure cylinder in inches.

P =boiler pressure.

C =length of crank in inches.

f =constant from following table.

For ordinary condensing engines, with two cylinders, when the pressure is not low:—

$$\text{Diameter of shaft in inches} = \sqrt[3]{\frac{D^2 \times P \times 2}{f}} C,$$

where D =diameter of cylinder.

P =boiler pressure.

C =length of crank in inches.

f =constant from following table.

TABLE.

Constant.	Angle between Cranks.	For Crank and Propeller Shafts.	For Tunnel Shaft.
f	90°	2468	2880
"	100°	2279	2659
"	110°	2131	2487
"	120°	2016	2352
"	130°	1926	2248
"	140°	1858	2168
"	150°	1806	2108
"	160°	1772	2068
"	170°	1752	2045
"	180°	1746	2037

Surveyors should not grant a declaration for twelve months whenever they have any doubt whatever as to the efficiency of any portion of the vessel, or her machinery, for such period.

Distilling apparatus for making fresh water.

How to be examined, and what is to be capable of doing.

120. The distilling apparatus of emigrant ships must be taken to pieces every voyage, except in the cases of steamers holding passenger certificates, which must be taken to pieces at least once every six months, or oftener, if the Surveyor thinks it necessary, and the tubes or coils tested to at least twice the highest working pressure of the boiler from which the apparatus can be worked, and the machinery and boilers thoroughly examined. After the distilling apparatus is put together again, it must be tested as to the quantity and quality of the water made.

The water must be perfectly cool, pure, and fit to drink immediately it is drawn off from the filter. No distilling apparatus is to be passed, unless fitted with a suitable sized filter, charged with animal charcoal, the charcoal must be taken out, cleansed, or renewed every voyage, except in cases of steamers holding passenger certificates, in which case it need not be taken out, unless the Surveyor think it necessary, oftener than every six months. In such cases (where sea-going steamers are coming frequently in for survey under the Emigration Acts, and such complete examination is not made previous to each voyage,) the Surveyor will be held wholly responsible for the efficiency of the apparatus; but the quantity and quality of the water

must be tried previous to every voyage. It therefore rests with him whether he orders the distilling apparatus to be taken to pieces every voyage or not. The boilers must be at least equal in strength to the boilers of passenger steamers, and must have the same fittings as is necessary for them, in accordance with the Regulations. The Surveyor must satisfy himself as to the capability of the man who is to have charge of the apparatus.

The steam for working the apparatus is not to be taken from the main boilers. No exhaust steam must be permitted to go into the condenser if appliances for the introduction of lubricants be fitted to the steam pipes, or steam cylinder of the pumping engine. The boiler of the apparatus must not be filled or fed with water from the surface condensers of the main engines, and must not be fitted with cocks, &c., for the introduction of tallow or oil.

When the water is pumped into the condenser, there should be an escape valve fitted to it, which cannot be readily tampered with; and if the condensing portion of the apparatus or the cooler and filter be unfit to bear the pressure on the boiler, an efficient safety-valve, that cannot be readily overloaded, should be fitted between the steam-pipe and the apparatus.

121. It is advisable that the donkey-engine for pumping water through the condenser be so fitted that it can be available in case of emergency for extinguishing fire in any part of the ship; a leather hose, with suitable bends and conductors, are to be supplied for this purpose.

Pump for distilling apparatus to be fitted as fire-engine.

122. The following list of tools and materials must be provided for distilling apparatus:—

Stores to be carried with distilling apparatus.

- 1 set of stoking tools.
- 1 sealing tool.
- 1 spanner for boiler doors.
- 1 set of fire-bars, suitable for boiler.
- 1 14-inch flat bastard file.
- 1 14-inch half-round file.
- 1 10-inch round file.
- 3 file handles.
- 2 hand cold-chisels.
- 1 chipping hammer.
- 1 pair patent gas-tongs.
- 1 soldering iron.
- 10 lbs. of solder.
- 2 „ of rosin.
- 6 gauge-glasses.
- 24 india-rubber gauge-glass washers.
- 30 bolts and nuts, assorted.
- 1 slide-rod for donkey-pump.
- 5 lbs. spun-yarn.
- 10 „ cotton-waste.
- 1 deal box, with lock complete.
- 2 gallons machinery oil.
- Animal charcoal sufficient to charge the filter at least twice.
- 1 can for machinery oil.
- 1 oil-feeder.
- 1 small bench vice.
- 1 ratchet-brace.
- 4 drills, assorted.
- 1 set dies and taps, suitable for the bolts.
- 2 glass salinometers.
- 1 hydrometer and pot.
- 1 shifting spanner.
- 1 lamp for engineer.

And other articles that the particular distiller and boiler supplied may, in the Surveyor's judgment, require.

List of distilling apparatus that have been approved by the

1. Normandy's patent.
2. Winchester and Graveley's patent.
3. Chaptin & Co.'s patent.
4. Brown & Co.'s patent.
5. Fraser's patent.
6. Hocking & Co.'s patent.
7. Kirkaldy's patent.
8. Siddeley & Co.'s patent.
9. Rayner's patent.
10. Union S. S. Co.'s patent.
11. Willoughby & Co.'s patent.

ACCIDENTS AND DAMAGES.

Damage to be inspected.

123. In all cases in which a steam-ship has sustained damage from any accident, or other cause, affecting her seaworthiness or efficiency in any part of her hull, equipments, or machinery, the surveyors of the port where the vessel may be, are to go on board and ascertain the extent of the damage. In doing so they will take care not to make any change in the position or condition of things on board, which would be at all likely to affect any legal evidence, should an enquiry into the case afterwards be considered necessary.

It is extremely important that the vessel should be surveyed and a report forwarded as early as possible.

Report to be sent to Government.

124. They are forthwith to send a report, together with a rough figured sketch, showing the position of all the bulkheads, and distinguishing the compartments that may have been injured, to the Government, in order that the certificate may be cancelled, if necessary. In this report they are to state whether the vessel is rendered inefficient or unseaworthy either in hull or machinery; and whether, in their opinion, the certificate should be cancelled or only temporarily withdrawn.

Lights to be examined.

125. The Surveyor should at the same time examine the lights and screens of the vessel, and if the vessel with which she has been in collision is in port, he should examine the lights of that vessel also, and should forward to the Government, in a separate report, a statement respecting the size, condition, and place of her lamps and screens, and whether, in his opinion, they comply with the requirements of the regulations, and if not, in what respects they are deficient.

The Surveyors shall be very careful in wording their reports as to lights and screens, as they may be used in evidence in cases taken into court.

Surveyor may order vessel to be docked.

126. If, in consequence of any accident to a steam-ship, or for any other reason, the Surveyor considers it necessary to require the vessel to be taken into dock for the purpose of surveying the hull thereof, he may do so, but he is to be cautious never to exercise this power unless the circumstances of the case actually require it.

Certificate to be held during repairs.

127. Unless directions to the contrary are given, the Surveyor is to hold the certificate of the vessel during the time she is under repair, and for this purpose he is to require it of the master, unless the damage is such that in the Surveyor's judgment the certificate should be cancelled, in which case he should forward it to the officer authorized to grant certificates of survey under the Act, who will obtain the orders of Government on the subject. In all cases of serious damage the certificates should be cancelled.

Certificate may be endorsed if it has not been cancelled.

128. When the vessel is in every respect rendered sea-worthy and efficient, both in hull and machinery, to the entire satisfaction of the Surveyor, he is to put an endorsement on the back of the certificate and duplicate, if they have not previously been cancelled

to the effect that the damage has been made good so as to last for the period for which the certificate was granted, and return the certificate to the master or owner, or his agent, and allow the vessel to proceed.

CERTIFICATES OF MASTERS, MATES, AND ENGINEERS.

129. It will be the duty of the Surveyor to report in his declaration that the certificates of the Master, Mates, Engineers, and Engine-drivers of the vessel under survey are such as are required by the Act. Surveyors inspect certificates.

The Surveyors are to state on their declarations, in the appropriate place, the number and description of these certificates.

The details of the officers' certificates should be taken from the certificates themselves at every survey, the Surveyors carefully noting that by their certificates the officers are qualified for the positions they occupy.

PASSENGER ACCOMMODATION.*

130. The upper weather deck and the upper surface of the poop, fore-castle, and spar deck being exposed to the weather are not to be included in the measurements for passengers in sea-going steamers, during the foul season as defined by Government notification No. 1366, dated Simla, 26th May 1882, nor on voyages extending to 120 hours and upwards; nor are the poop, round-house, or deck-house to be measured for passengers, unless they form part of the permanent structure of the vessel. They should in all cases be railed round at the top to prevent passengers from falling overboard. Passenger in sea-going steam-ships

Care should be taken that the means provided for ventilation are sufficient to allow of a good supply of air in the event of the hatches being closed in bad weather. Places ventilated by hatches only, or in which provision is not made for a sufficient supply of air and light under ALL circumstances, should not be measured for passengers.

131. Sea-going steam-ships carrying more than 12 passengers, and not coming within the operation of the Passengers Act, 1876, are to be measured as follows:— Divisors for space check.

Saloon or 1st class.—The number of properly constructed fixed berths or sofas that are fitted determine the number of passengers to be allowed, if sufficient light and ventilation is provided and a reasonable amount of floor space—2nd class.—The number is found in the same way as the 1st class. The number of 3rd-class passengers may be determined in like manner, if berths are fitted; if not, the number of passengers for each deck shall be determined according to the following scale:—

	Fair season, square feet.	Foul season, square feet.	Long voyage.
Hurricane deck, bridge or poop ...	6	0	0
Main or upper deck ...	6	9	0
Upper 'tween decks ...	9	9	9
Lower „ „ ...	12	15	15

When 'tween deck passengers are carried, for each person so carried a space of 4 square feet is to be allowed on the upper deck or hurricane deck, bridge or poop.

The height of between decks to be in no case less than 6 feet from deck to deck when 'tween deck passengers are carried.

The breadth of the deck is taken inside the water-way, or at the greatest tumble home, if the sides do tumble home.

* Detailed instructions as to the proper mode of ascertaining the maximum number of passengers to be carried under the different classes of passenger certificates will be found in the appendix. (See Appendix A.)

Deduction
when stores
are carried in
passenger
space.

132. When cargo or stores are carried in the space measured for passengers, the area in superficial feet of deck space so occupied is to be deducted.

In the following rules the words "deck passengers" are intended to include all passengers, whether carried on deck or in the cabins, except passengers entered as 2nd class or saloon passengers in the way bill.

Water-closets
in sea-going
ships.

133. In addition to, and exclusive of, closets for cabin and saloon passengers, closets are to be provided for the *exclusive use of deck passengers* in the ratio of three for every two hundred deck passengers allowed by the survey certificate, and a fair proportion are to be allotted to the sole use of women and children, and so marked outside. Clear passages to these closets must always be maintained. In no case is a less number than two to be provided. These closets should be clean, well lighted, and well drained, and must be of sufficient height and size, and effectually protected from weather and sea.

A rramgement
necessary
when cattle
are carried

134. If cattle are carried under cover on the same level deck as passengers, they are to be separated from the passenger space by a moveable close bulkhead running athwartships across the deck, and extending from the deck to the covering above, or must be otherwise efficiently separated.

When the cattle are not under cover, the space occupied by the cattle shall be effectually shut off from the passenger space by bulk-heads, wooden partitions, or otherwise. The partitions need not be close; but efficient wash-boards must be fitted to prevent the dung or urine of the cattle from getting on to the passenger space.

If cattle are carried either in the 'tween decks or holds, then the passenger space must be effectually shut off from the cattle space, and separately ventilated, so that no effluvia from the cattle space can escape into the passenger space.

135. The Surveyors should measure the ship in sections or parts, as set forth in the applications for survey, taking care that some definite limits, or some mark, or conspicuous object, indicates the boundary of each space which is measured separately.

The deck space set apart for deck or third class passengers is always to be measured from abaft the windlass (as at present), to a mark which, in paddle steamers, shall be placed over the shafts, and in other vessels shall be an arbitrary line marked vertically on the house or bulwarks amidships, or as near thereto as convenient. From this mark aft the deck space is to be measured as far as the deck or third class passengers accommodation extends, whether to a break or raised quarter-deck; to a poop or the entire after length of the deck, to the wheel, as the case may be. The breadth of measurement shall be to a point which affords good and convenient foot-room.

Spaces on deck for first class passengers, and for all passengers other than those included in the category of deck or third class passengers, are to be measured in a similar manner.

The breadths are taken from inside the gutter water-way, or the inside edge of the raised covering board, or inside edge of the rail, if the bulwarks tumble home further than the inside edge of water-way or covering board. Clear area means the space after all incumbrances, such as hatchways, skylights, companions, steam-chest casings, funnel casings, wheel, windlass, binnacles, masts, dunnage for luggage, boats carried inboard, and fittings for cattle, &c., are deducted, and in no case is the crew space to be included.

Where cargo, cattle, &c., are carried in the space measured for passengers in sea-going passenger

steamers, the following deductions are to be made. For every nine superficial feet of such space so occupied during the foul season, and for every six superficial feet of such space so occupied during the fair season, one passenger is to be deducted from the number of passengers the vessel would otherwise be allowed to carry.

136. The number of passengers to be carried in the after-cabins or saloons is determined by the number of the berths or sofas properly constructed for sleeping berths. All passenger accommodation should be properly lighted and ventilated, and proper means of ingress and egress provided. The number of second-cabin passengers is obtained in the same way as the after-cabin number. All floors of passenger accommodation must be caulked and properly secured.

Number of
passengers
below deck,
how
ascertained.

137. To meet the case of sea-going vessels making short voyages, that is when the time occupied between leaving one port and arriving at the next port does not extend to 120 hours the poop, and midship house may be included in the measurement for passengers, provided the Surveyor is satisfied that the vessel is sufficiently stable, and that the spaces included are fitted with either substantial bulwarks or sufficient weather-cloths. This rule shall not apply to any short voyage which forms only a part of a longer voyage, except to meet the case of passengers who do not remain on board longer than forty-eight hours.

Short voyages.

138. Where there are deck-houses and only narrow space between the sides of the deck-house and the bulwarks, such narrow spaces are not to be measured for passengers.

Passengers
deck-houses.

139. In no case is the space set apart and certified for the use of crew to be included in the measurement for passengers.

Crew spaces.

140. The surveyors are to be careful to see that the lights and fog signals are in accordance with the regulations for the prevention of collisions at sea, and are to inspect them at each survey.

Lights and
fog signals.



No. _____

CERTIFICATE OF SURVEY

Issued under Act VII of 1884 of the Governor-General in Council by the Government of Bengal,
For a Sea-going Steam Ship.

TO REMAIN IN FORCE ONLY UNTIL THE _____ DAY OF _____ 188 .

STEAM SHIP _____

Owner, Managing Owner, or Agent _____

Port of Registry and Official Number.	Register Tonnage.	Name of Master and Number of his Certificate.

TRADE
for which this Certificate is issued.

NUMBER OF PASSENGERS

This Ship is, according to the declaration of the Surveyor, fit to carry
WHEN THERE IS NO INCUMBRANCE OF PASSENGER ACCOMMODATION :—

	Deck Passengers.								Second Class Passengers.		Saloon Passengers.		Total Passengers.	
	SHORT VOYAGES.								LONG VOYAGES.					
	Fair season.				Foul season.									
	Fore.	Main, if in 3 compart- ments.	Aft.	Total.	Fore.	Main, if in 3 compart- ments.	Aft.	Total.	Fore.	Main, if in 3 compart- ments.	Aft.	Total.		
'Tween decks { Upper { Lower 														
Upper deck, if 'tween deck passengers are carried ...														
Upper deck, if no 'tween deck passengers are carried ...														
Hurricane deck bridge or poop, if given to third class passengers 														
NOTE.—A space of 72 superficial feet has been reserved on the														

N.B.—The Saloon and Second Class Passengers are to have the use of sufficient space on the Upper Deck of the Vessel.
Two Children under 12 Years of Age to be reckoned as One Passenger.

If the space measured for Passenger accommodation is occupied by Cattle, or by Cargo or other articles,
Then for every nine superficial of such space so occupied during { One Passenger } Is to be deducted from the numbers above stated.
the foul season and for every six superficial feet of such space {
so occupied during the fair season.

NOTE.—If on any voyage a Certificate for this Vessel is issued under the Native Passengers Acts, then the Number of Passengers on that Certificate, and not the Number stated on this Certificate, is the Number of Passengers this Vessel is authorized to carry on such voyage.

BOATS, LIFE-BUOYS, AND EQUIPMENTS REQUIRED TO BE CARRIED BY THIS SHIP.

Boats and Life-Boats.			Life-Buoys and Equipments.	
Boats {	Either of the aggregate capacity of }	Cubic feet.	A Fire Hose capable of being connected with the engine and of sufficient length to be used in any part of the vessel.	
Boats {	or of the aggregate capacity of }	Cubic feet.	A Safety Valve on each boiler, out of the control of any person on board except the Master, when the steam is up.	
Boat {	and of the capacity of }	Cubic feet.	Twelve Blue Lights or Twelve Port Fires.	
			One Cannon and Twelve Cartridges or other approved means of making signals of distress.	
Life-Boats Fitted with all requisites for use.			Two Life-Buoys fit and ready for use.	
Two Life-boats {	of the aggregate capacity of }	1,000 Cubic feet.	Compasses properly adjusted.	

If on any occasion this Steam Ship is employed in carrying Passengers under the provisions of the Native Passengers Acts, then the Boats required by the Passengers Acts, and not the Boats required by the Merchant Shipping Act, 1854, are to be carried.

THIS IS TO CERTIFY that the provisions of the Law with respect to the survey of the above-mentioned Steam Ship and the transmission of Declarations in respect thereof have been complied with.

Signed by order of the Government of Bengal,
This _____ day of _____ 188 .

Examined and Registered, { Vice-Chairman to the Commissioners for making Improvements in the Port of Calcutta.

This Certificate, unless previously cancelled or revoked, to be in force until the _____ day of _____ 188 .
If the Ship is then out of a port of survey, she must be surveyed and have a new Certificate before she first begins to ply with Passengers after her next subsequent return to a port of Survey.
Either this Certificate, or the Duplicate thereof, furnished by the Government of Bengal, is to be put up in a conspicuous part of the Ship, where it will be visible to all persons on board the same.

If the number of Passengers carried exceeds the number stated on this Certificate, the Master or owner will be liable to the penalty prescribed in the Acts of the Indian Council or the English Merchant Shipping Acts.
In case of any accident occasioning loss of life, or any material damage affecting the seaworthiness or efficiency of the vessel, either in the hull or in any part of the machinery, a report by letter, signed by the Owner or Master, is to be forwarded to the Port Commissioners, Calcutta, within 24 hours after arriving in Port, or as soon thereafter as possible.

N.B.—Any communication addressed to the Government of Bengal relative to this Vessel should state the Name, Port of Registry, and Official Number of the Vessel, and the Number of his Certificate.

1911

I hereby declare as follows, viz. —

- (1) That on the day of 188 I inspected the hull of the steam-ship named in the space, marked column 1, in this form, and the boats, life-buoys, lights, signals, and other equipments on board the same, and the certificates of the master and mates.
- (2) That the hull of the said ship is sufficient for the service intended, and is in good condition.
- (3) That the boats, life-buoys, lights, signals, compasses and shelter for deck passengers on board the said ship, and the certificates of the master and mate or mates are such and in such condition as required by the rules under Act VII of 1884.
- (4) That the hull of the said ship and the equipments before named will, in my judgment, be sufficient until the day of next.
- (5) That the said ship is, in my judgment, fit to ply as a sea-going steam-ship with the number of passengers stated in the space, marked column 18, in this form, when there is no encumbrance of the space measured for the passenger accommodation; but is not fit to ply as a sea-going steam-ship with a greater number of passengers.
- (6) That on the date first above named I inspected the machinery of the said ship and all the safety-valves and fire-hose on board the same.
- (7) That the machinery of the said ship is sufficient for the service intended, and in good condition.
- (8) That the said machinery will, in my judgment, be sufficient until the date fourth above named.
- (9) That the safety-valves and fire-hose are such and in such condition as required by the rules under Act VII of 1884.
- (10) That the weight to be placed on the safety-valves in the said ship is not to exceed the "pressure per square inch in lbs" stated in column 8 in this form, and that such weight has been placed on them accordingly.
- (11) That the certificate or certificates of the engineer or engineers is or are such and in such condition as required by Act VII of 1884.
- (12) That the said ship as regards her machinery is, in my judgment, fit to ply as a sea-going steam-ship.

DATED AT

This

day of

188 . }

*Engineer and Shipwright Surveyor to Government
under Act VII of 1884.*

[Second Publication.]

NOTICE.

The 6th November 1885.—The following draft of Rules, which it is proposed to issue under section 29 of Act VI of 1884 and section 36 of Act VII of 1884, is published for general information. These rules will be taken into consideration on the expiry of a month from the date of their first publication in the *Calcutta Gazette*; and the Lieutenant-Governor will receive and give due attention to any objections or suggestions which may be made by any person within that period.

J. WARE EDGAR,
Offg. Secy. to the Govt. of Bengal.

*Rules for the examination of, and grant of Certificates to,
Masters of Inland Steam Vessels under section 29, Act VI
of 1884.*

1. Candidates for certificates as first class Masters of Inland Steam-vessels must be not less than twenty-one years of age and must have served either three years at sea and three years as Mate of a river steamer or Master of a flat, or six years as Mate of a river steamer or Master of a river flat.

2. Every such Candidate shall apply for permission to appear for examination in a printed form* to be filled up by him and forwarded to the Port Officer, Calcutta, together with such documentary evidence as shall satisfy the Port Officer that the Candidate has complied with the conditions of Rule 66 above, and that he is of sober habits and of good character. Each Candidate shall forward with his application a fee of Rs. 16, which will not be returned in case of failure.

3. The Port Officer shall notify to accepted Candidates the date and hour of examination, in fixing which he shall have due regard to the convenience of their employers. The fees of any Candidate who is not accepted shall be returned to him.

4. The examination of Candidates shall ordinarily be conducted by the Committee which sits quarterly for the examination of Pilots, assisted by two persons selected in each case by the Port Officer, holding certificates as first class Masters of Inland Steam Vessels, duly in force under these rules. But the Port Officer may at any time convene a Special Committee for the examination of Candidates under these rules.

5. Before proceeding to examine any Candidate in the manner provided in the rule next following, the Committee shall carefully test his ability to distinguish the following colours which enter largely into the combinations of signals by day and night, viz. black, white, red, green, yellow, and blue. In the event of any Candidate failing to satisfy completely the usual tests for colour-blindness in respect of all of these colours, the Committee will decline to proceed with his examination, and will report the case through the Port Officer for the information of the local Government.

6. The Committee will examine each Candidate apart, and *vis à vis*, in each and all of the following subjects:—

- (1).—The names and courses of the river reaches from Calcutta to Mud Point, and the extent of the sands in such reaches.
- (2).—The sets of the tides within the said limits.
- (3).—The names of all points in the river within the said limits.
- (4).—The candidate's general knowledge of soundings in the channels and over the sands within the said limits.
- (5).—The tracks over the Moyapore and Royapore flats, the Fultah tracks, and the Eastern and Western Guts.
- (6).—The marks for fair channels or hauling in to reaches where such exist.
- (7).—The marks for the limits of sands where such exist.
- (8).—The rules of the road.
- (9).—The management of river steamers under all contingencies of meeting, overtaking, and passing vessels in all possible positions within the limits described in No. 1.
- (10).—The Tide Table.

(11).—The rules of the Port of Calcutta including the prescribed Storm Signals.

(12).—The provisions of Act VI of 1884, and the rules framed under it.

7. If the Candidate satisfy the Committee as to his knowledge of the subjects set forth in the foregoing rule, and generally as to his competency to command an inland river steamer, they shall certify the same to the Port Officer, who will then grant a certificate of such competency in the form appended to these rules.

8. Every certificate of competency shall be made in duplicate, and one copy shall be delivered to the person entitled to the certificate and the other shall be kept and recorded by the Port Office.

9. No Candidate who fails to satisfy the Committee shall be at liberty to submit a fresh application for examination until six months have passed from the date of such failure.

10. A candidate for a certificate as second class Master of an Inland Steam vessel must produce satisfactory certificates of sobriety and intelligence, and that he has served four years as mate of a small steam vessel or helmsman of a large steam vessel, and shall be examined by the examining body defined in rule 69 *videlicet* as to his knowledge in the following subjects:—Colours, rule of the road and lights, management of small river steamers, rules of the Port of Calcutta and storm signals.

11. A fee of Rs. 6 will be charged, which will not be returned in case of failure.

By the Honourable the Lieutenant-Governor of Bengal.



Certificate of Competency

AS

FIRST CLASS MASTER OF AN INLAND STEAM VESSEL UNDER ACT VI OF 1884.

To

Mr. _____

Whereas it has been reported to me that you have been found, after examination, duly qualified to fulfil the duties of First-class Master of an Inland Steam Vessel under Act VI of 1884, I do hereby grant you this CERTIFICATE OF COMPETENCY as such First-class Master.

Given under my Hand and Seal,

By order of the Government of Bengal,

Port Officer, Calcutta.

This _____ day of _____

Registered at the Office of the Port Officer.

No. of Certificate

Address of Owner

and Place of Birth

Signature

N.B.—Any person other than the owner thereof becoming possessed of this Certificate is required to transmit it forthwith to the Port Officer, Calcutta.

Issued at the Port of Calcutta on the day of 18

By the Honourable the Lieutenant-Governor of Bengal.



Government of
Bengal.

Certificate of Competency

AS

SECOND CLASS MASTER OF AN INLAND STEAM VESSEL UNDER ACT VI OF 1884.

Mr.

Whereas it has been reported to me that you have been found, after examination, duly qualified to fulfil the duties of Second-class Master of an Inland Steam Vessel under Act VI of 1884, I do hereby grant you this CERTIFICATE OF COMPETENCY as such Second-class Master.

By order of the Government of Bengal,

Given under my Hand and Seal,

Port Officer, Calcutta.

day of 18

Registered at the Office of the Port Officer.

No. of Certificate

Address of Owner

and Place of Birth

Signature

N.B.—Any person other than the owner thereof becoming possessed of this Certificate is required to transmit it forthwith to the Port Officer, Calcutta.

Issued at the Port of Calcutta on the day of 18

REGULATIONS

RELATING TO THE

EXAMINATIONS OF ENGINEERS
AND ENGINE-DRIVERS.

UNDER SECTION 29, ACT VI OF 1884, AND SECTION 26, ACT VII OF 1884.

EXAMINATION OF ENGINEERS FOR CERTI-
FICATES OF COMPETENCY.

Preliminary.

The penalties incurred by persons proceeding to sea in the capacity of Engineers or Engine-drivers without possessing the necessary certificate are laid down in the Indian Steam Ships Act, VII of 1884, and the Inland Steam Vessels Act, VI of 1884.

Certificates of competency granted to persons who pass requisite examinations.

1. CERTIFICATES of competency will be granted to those persons who pass the requisite examinations, and otherwise comply with the requisite conditions.

2. Examinations will be held once every two months by the Chief Engineer of the Dockyard, and two Engineers who will be appointed by the local Government under section 22 of Act VI of 1884, and section 26 of Act VII of 1884. The Chief Engineer will be the permanent President of the Examining Committee, and the other members will usually be selected from the Superintending Engineers of the different Steam Companies in the port. Each examiner will receive a fee of Rs. 32 for the examination.

3. Every certificate of competency shall be made in duplicate, and one copy shall be delivered to the person entitled to the certificate and the other shall be kept and recorded by the Port Officer.

Examinations continued till all the candidates are examined.

4. The examinations will commence early in the forenoon and will be continued from day to day until all the candidates whose names appear upon the Port Officer's list on the day of examination are examined.

Application how to be made.

5. The application for examination is to be made on Form Exn. 3, which may be obtained at the Port Office. The Exn. 3 properly filled in, together with the Candidate's testimonials, must be lodged with the Port Officer not later than the day before the day of examination.

Testimonials required.

6. Applicants will be required to produce, in addition to the usual Forms of Discharge, satisfactory testimonials as to sobriety, experience, ability, and general good conduct for at least the 12 months immediately preceding the date of application to be examined, and without producing them no person will be examined. If the service has been on shore the testimonial must be signed by an Employer, if at sea by the Master, Managing Owner, and Chief or Superintending Engineer.

7. As such testimonials and discharges have to be verified before the candidates can be examined, it is desirable that they should be handed in, together with the Form Exn. 3, as early as possible.

Testimonials of Foreigners.

8. The testimonials of servitude of Foreigners and of British Seamen serving in foreign vessels which cannot be verified by the Port Officer must be confirmed either by the Consul of the country to which the ship in which the candidate served belonged, or by some other recognized official authority of that country; or by the testimony of some credible person on the spot having personal knowledge of the facts required to be established. The production, however, of such proofs will not of necessity be deemed sufficient. Each case must be decided on its own merits; and if the sufficiency of the proofs given appears to be at all doubtful, the point must be referred to the Local Government.

9. Should any doubt exist as to the age of a Candidate he will be required to produce a Certificate of Birth or Baptism. Certificate as to age.

10. Foreigners must prove to the satisfaction of the Examiners that they can speak and write the English language sufficiently well to perform the duties required of them on board a British vessel. Foreigners to know English.

11. Services which cannot be verified by proper entries in the Articles of the Ships in which the Candidates have served cannot be counted. Verification of services, &c., by Articles.

12. Service performed on rivers, or within smooth or partially smooth water limits, cannot be accepted, except for inland steamers.

13. Service entered upon a Ship's Articles as having been performed in the capacity of Assistant Engineer must be supported by proof of the Candidate having acted as 2nd, 3rd, 4th, &c., Engineer, as the case may be. Assistant Engineer.

14. The service required by the Regulations to qualify a candidate for examination is to be regarded as referring to service in the Foreign Trade only. Service in the Home or Coasting Trade must amount to at least half as much again as that required by the Regulations to make up for the time spent in Port, *e.g.*, for every twelve months' service under the Regulations, eighteen months' service in Home Trade or Coasting Vessels will be required. Service in Home or Coasting Trade.

15. Service in the engine-room (afterwards referred to) for qualifying a candidate to be examined for a Second-class Engineer's Certificate must be only in those capacities which afford opportunities of obtaining practical experience as an engineer; and service in the capacity of fireman, stoker, donkeyman, greaser, winchman, labourer, engineer's steward, or any other capacity than that of engineer taking watch will not be accepted. Service as Engineer only accepted as qualifying service.

16. Service as a Third Engineer in Steamers, where more than three Engineers are carried, their names being entered on the Articles in their respective ratings on board, may be accepted as equivalent to service as Second Engineer for qualifying a candidate for examination for a First-class Engineer's Certificate, provided the candidate has been in possession of a Second-class Engineer's Certificate (Imperial or under an Order in Council) during the performance of such service, and his name has been entered on the Articles as Third Engineer. Service as Third Engineer.

17. If a candidate has served in the Engine-Room with a Second-class Certificate in the capacity of a Second Engineer in Foreign-going Steam Ships under 100 horse-power or in Home Trade Passenger Steam Ships, which are not required by law to carry a certificated Second Engineer, his service may be accepted without reference to the vessel's horse-power, provided he has been on the ship's articles as Second Engineer, and produces certificates of discharge as Second Engineer, for the required period. Service as Second Engineer where Certificate not required.

18. The Port Officer may see fit to allow an applicant who, in consequence of service abroad, has been unable to obtain a Second-class Certificate, to be examined for a First-class Certificate, without first obtaining a Certificate of the lower grade, provided he is able to satisfy him as to the satisfactory character of his services. First-class Certificates without Second.

19. In such cases (para. 17) or in cases where the candidate is already in possession of a Certificate of Service, should he fail to pass the examination for the higher grade, but passes the examination for the lower grade, he may receive a Certificate accordingly, but no part of the fee will be returned. Unsuccessful candidates may in certain cases receive Certificates for inferior grade.

20. A candidate who under the above regulation (para. 17) has been permitted to be examined for a First-class Certificate without first obtaining a Second-class Certificate of Competency, and who fails in his *vis à voce* examination, may not be re-examined for a Certificate of the higher grade until he has served 12 months as Second Engineer with a Second-class Engineer's Certificate of Competency as required by the Regulations. Consequence of failure in such cases.

21. If the candidate fails altogether, *i.e.*, both in the examination for the lower as well as for the higher grade of Certificate (para. 17) he may be re-examined for a *Second-class Certificate only*, subject to the usual regulations relating to failure.

Inaccurate
statements of
service.

22. Every person who makes, or procures to be made, or assists in making, any false representation for the purpose of obtaining for himself or for any other person a Certificate of Competency, shall for each offence be liable to punishment under chapters V and XI of the Indian Penal Code.

23. These provisions will be *strictly enforced* by the Local Government, and any candidate for a Certificate of Competency as First or Second Engineer who shall, for the purpose of obtaining any such Certificate, present to the Examiner any "application to be examined for a Certificate of Competency" (Exn. 3.), or statutory declaration containing any false or inaccurate statement of service, and any other person who shall make or prepare, or assist in making or preparing, any such false or inaccurate statement will be *prosecuted*.

If after passing
examination
services are
found to have
been insuffi-
cient.

24. If after a candidate has passed his examination it is discovered on further investigation, *e.g.*, by verification on the part of the Port Officer that his services are insufficient to entitle him to receive a Certificate of the grade for which he has passed, it will not be granted to him; but if the Local Government are satisfied that the error in the calculation of his services did not occur through any fault or wilful misrepresentation on his part, the Certificate may be issued to him, or he may be allowed to go up for re-examination without payment of further fee, when he has performed the amount of service in which he was deficient as the Local Government may direct.

Certificate of
lower grade
may be granted
on certain
conditions.

25. If, in such a case, the applicant's services are sufficient to entitle him to receive a Certificate of a lower grade, provided as aforesaid he has not wilfully misrepresented the amount of his services, an Inferior Certificate may be granted to him, and the difference between the fee paid by him for the Superior Certificate and the fee payable for the Inferior Certificate may be placed to his credit.

Must be re-
examined for
certificate of
higher grade.

26. In such a case when the applicant has by further service made up the time in which he was found to be short, he may be required, before he can receive the higher Certificate, to be re-examined in all the subjects.

Qualifications for Certificates of Competency

27. AS ENGINE-DRIVERS.

a. Such certificates of competency will be granted only to those persons who possess the qualifications hereinafter detailed and otherwise comply with the requisite conditions.

b. Applications for such certificates of competency are to be made to the Port Officer, on whose recommendation examiners will be appointed to test the qualifications of candidates under the following rules.

c. A candidate for a certificate of competency under these rules must have attained the age of twenty-two years.

d. He must have the testimonial shown in one of the appendices to this code of rules filled up by the engineer with whom he has last served, or his other testimonials must contain all the particulars therein required.

e. The fee for examination under these rules will be ten rupees, and the amount must be remitted with the application to the Port Officer. If a candidate fails, no part of the fee he has paid will be returned to him.

f. Such certificates will be granted by the Port Officer in the form prescribed in one of the appendices to this code.

g. In case of failure, candidates may be re-examined *de novo* after a lapse of six months, if the past examination showed that they might reasonably be expected to qualify.

FOR INLAND STEAMERS UNDER ACT VI OF 1884.

a. He must have been three years principal serang or tindal in the engine-room of a steamer, or have been three years in charges of the engine of a factory or mill under a European manager or engineer, as well as one year principal serang or tindal or assistant engineer in the engine-room of a steamer under a certificated engineer, or he must prove that he has been employed for not less than five years in the making and repairing of engines, and has been employed as assistant in the engine-room of a steamer or in charge of a steam launch for a period of not less than twelve months.

b. He must pass a *vidé voce* examination before the Board of Examiners as to the working of an engine and the use of its different parts.

c. He must be able to show his practical qualifications by one week's trial in a Government steamer after fulfilling the other tests to which he will be subjected.

FOR SEA-GOING STEAMERS UNDER ACT VII OF 1884.

A candidate will be required to have served three years as principal serang or as tindal in the engine-room of a sea-going steamer under a certificated Engineer, and to show, in addition to the qualifications required of a candidate for a certificate of competency as engine-driver of an inland steamer under Act VI of 1884, a knowledge of the use of brine cocks and blowing off of the salinometer, and of the care of the boiler in salt-water.

FOR INLAND STEAMERS UNDER ACT VI OF 1884.

28. A candidate for a certificate as Engineer for Inland Steamers must have served an apprenticeship to an Engineer, of three years in England or five years in India, and must prove that during the period of his apprenticeship he has been employed on the making and repairing of engines. Or, if he has not served an apprenticeship, he must prove that for not less than three years in England or five years in India he has been employed as a journeyman or master-hand in some factory or workshop on the making or repairing of engines. In either case he must also have served two years thereafter as an engine-driver or Engineer afloat. Any one who has passed as a Second class Engineer under Act VII of 1884 will be considered to be qualified as an Engineer for inland steamers.

Qualification of
candidate for
Inland
Engineer's
Certificate.

FOR SEA-GOING STEAMERS.

29. SECOND-CLASS ENGINEER.—A candidate for a Second-class Engineer's Certificate must be 21 years of age ;

He must have served an apprenticeship to an Engineer for three years in England or five in India at least, and prove that during the period of his apprenticeship he has been employed on the making and repairing of engines. Or if he has not served an apprenticeship, he must prove that for not less than three years in England or five in India he has been employed as a journeyman mechanic in some factory or workshop on the making or repairing of engines.* In either case he must also have served one year at sea in the engine-room as an Engineer on the Watch in the Foreign, or eighteen months in the Home or Coasting Trade ; or

He must have served at least four years at sea in the engine-room as an Engineer on the Watch in the Foreign, or six years in the Home, or Coasting Trade.

Qualification of
candidate for
Second-class
Engineer's
Certificate.

* These may be either land or marine engines.

FOR BOTH CLASSES OF CANDIDATES.

- (a) He must be able to give a description of boilers, and the methods of staying them, together with the use and management of the different valves, cocks, pipes, and connections.
- (b) He must understand how to correct defects from accident, decay, &c., and the means of repairing such defects.
- (c) He must understand the use of the barometer, thermometer, and salinometer, and the principles on which they are constructed.
- (d) He must state the causes, effects, and usual remedies for incrustation and corrosion.
- (e) He must be able to state how a temporary or permanent repair could be effected in case of derangement of a part of the machinery, or total break down.
- (f) He must write a legible hand, and understand the first five rules of arithmetic, and decimals, and their application to questions about consumption of stores, and full capacities of tanks and bunkers, the duty of pumps, and the direct strains in engines and boilers.
- (g) He must be able to pass a creditable examination as to the various constructions of paddle and screw engines in general use; as to the details of the different working parts, external and internal, and the use of each part.

FOR SEA-GOING STEAMERS.

Qualification of
candidate for
First-class
Engineer's
Certificate.

30. FIRST-CLASS ENGINEER.—A candidate for a First-class Engineer's Certificate must be 22 years of age.

31. In addition to the qualification required for a Second-class Engineer;

- (a) He must have served for one year at sea as Second Engineer with a Second-class Engineer's Certificate of Competency (*See also para. 15 as regards service as Third Engineer*).
 - (b) The Examiner should therefore be satisfied that an applicant for a First-class Engineer's Certificate has not only been in possession of a Second-class Certificate for the periods above stated, but that he has actually served for such periods in the engine-room, at sea with a Second-class Certificate, in the capacities referred to, and that his name has been entered in the articles of agreement accordingly. (*See also para. 17.*)
32. (a) He will be required to make an intelligible hand sketch, or a working drawing of some one or more of the principal parts of a steam-engine; and to mark in, without a copy, all the necessary dimensions in figures, so that the sketch or drawing could be worked from.*
- (b) He must also be able to take off and calculate indicator diagrams.
 - (c) He must be able to calculate safety-valve pressures and the strength of the boiler, shell, stay, and rivetting.
 - (d) He must be able to state the general proportions borne by the principal parts of the machinery to each other, and to calculate the direct strain, the twisting strain, and the bending strain in rectangular bars, and in round bars with given loads.
 - (e) He must be able to explain the method of testing and altering the setting of the slide valves, and to sketch about what difference any alteration in the slide valve will make in the indicator diagram, and of testing the fairness of the paddle and screw shafts and of adjusting them.
 - (f) He must be conversant with surface condensation, superheating, and the working of steam expansively.

- (9.) His knowledge of arithmetic must include the mensuration of superficies and solids and the extraction of the square root, and the application of these rules to questions relating to the power, duty and economy of engines and boilers, and to the strains in rods, shafts, and levers of the engine.

Service in the Royal Navy or Indian Marine.

33. Retired Engineers of the Royal Navy or Indian Marine are qualified to be examined for First-class Engineer's Certificates in the Mercantile Marine, provided that their character and ability have been satisfactory. Engineers.

34. Retired First-class Assistant or Assistant Engineers of the Royal Navy or Indian Marine may be examined for Second-class Engineer's Certificates in the Mercantile Marine under similar conditions. Assistant Engineers.

35. Temporary service in the Royal Navy or Indian Marine does not count.

36. Service performed on shore in the capacity of Engineer Artificer may count as workshop service to qualify a candidate for examination for a Second-class Engineer's Certificate of Competency in the Mercantile Marine. Temporary service.
Engineer

37. Application for permission to be examined must be made to the Port Officer. Artificer.

Fees.

38. Candidates for examination, in making their application on Form Exn. 3, will be required to pay the examination fees before any step is taken, whether by inquiring into their services or testing their qualifications, &c.

39. The fee for examination must be paid to the Port Officer.

40. If a candidate fails in his examination, *no part of the fee he has paid will be returned to him.*

41. The fees are as follow:—

Engine-driver's Certificate	-	-	Rs. 10
Inland Engineer's Certificate	-	-	„ 12
Second-class Engineer's Certificate	-	-	„ 12
First-class Engineer's Certificate	-	-	„ 24
First-class Engineer's Certificate if candidate is already in possession of a Second-class Certificate of competency granted by the Board of Trade or by the Government of a British Possession under Section 8 of the Merchant Shipping (Colonial) Act, 1869			
	-	-	„ 12
Renewal of any certificate	-	-	„ 5

Fees to be paid by applicants for examination. (S. 133, Exn. 17.)

General Rules as to Examinations.

42. All books necessary for the use of candidates under examination will be provided by the Local Government, and applicants will not be permitted to take into the examination room any book, paper, document, or memoranda of any description whatever, and subject to the provisions referred to hereafter. They will also not be allowed to work out their problems on a slate or on waste paper. Candidates not to take books, &c., into examination room.

43. Candidates will be allowed in the time allotted to cancel any part of their work, and when required additional papers will be supplied by the examiners. These additional sheets must be attached to and form part of the examination papers.

44. Candidates for First-class Certificates have to pass an examination in Rough Working Drawing, which may be either hand sketches clearly dimensioned and complete in the necessary views and sections, or drawings to a scale. Drawing boards and T squares will be provided by the Local Government, but the applicants will have to bring with them any drawing instruments they may require.*